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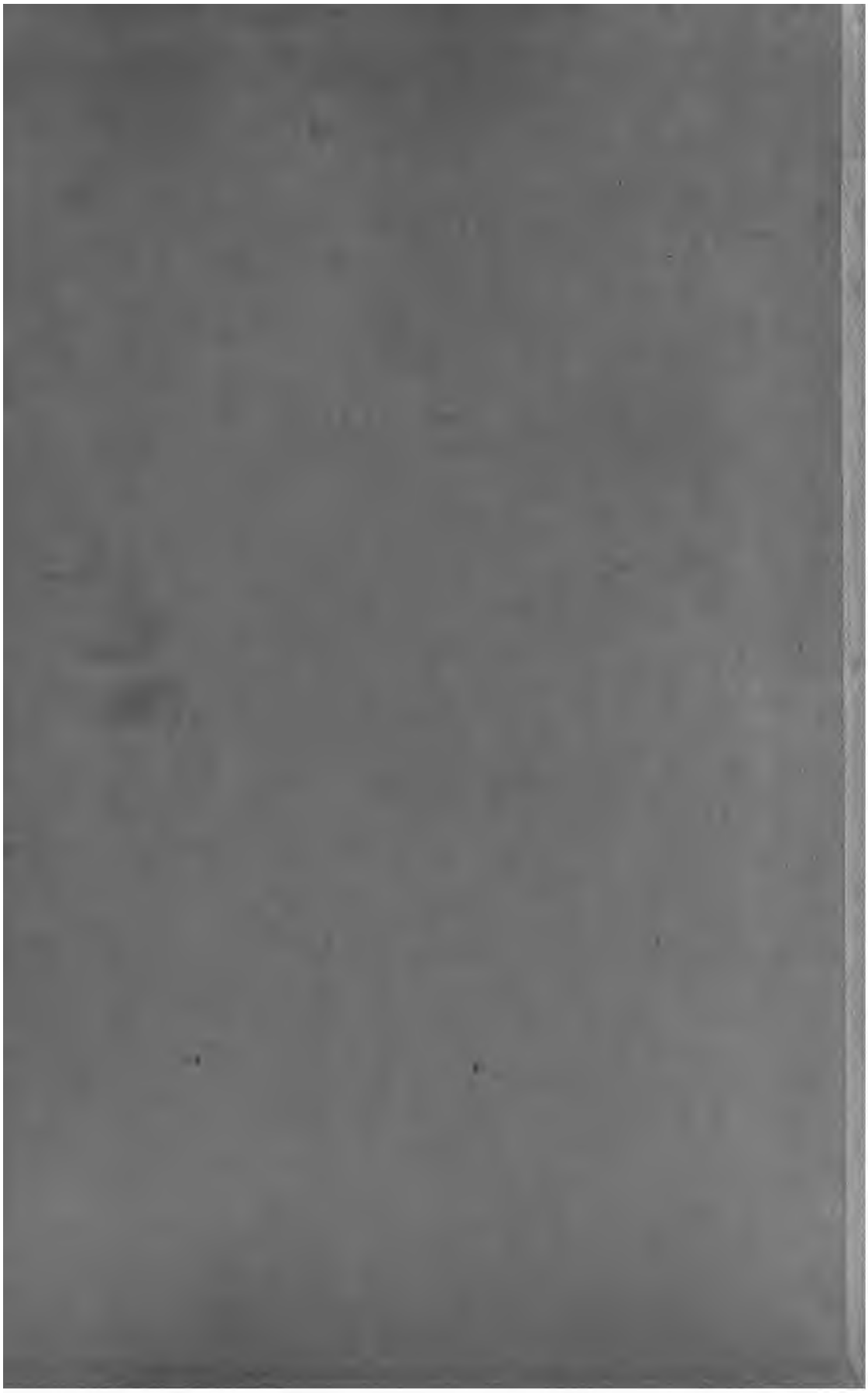

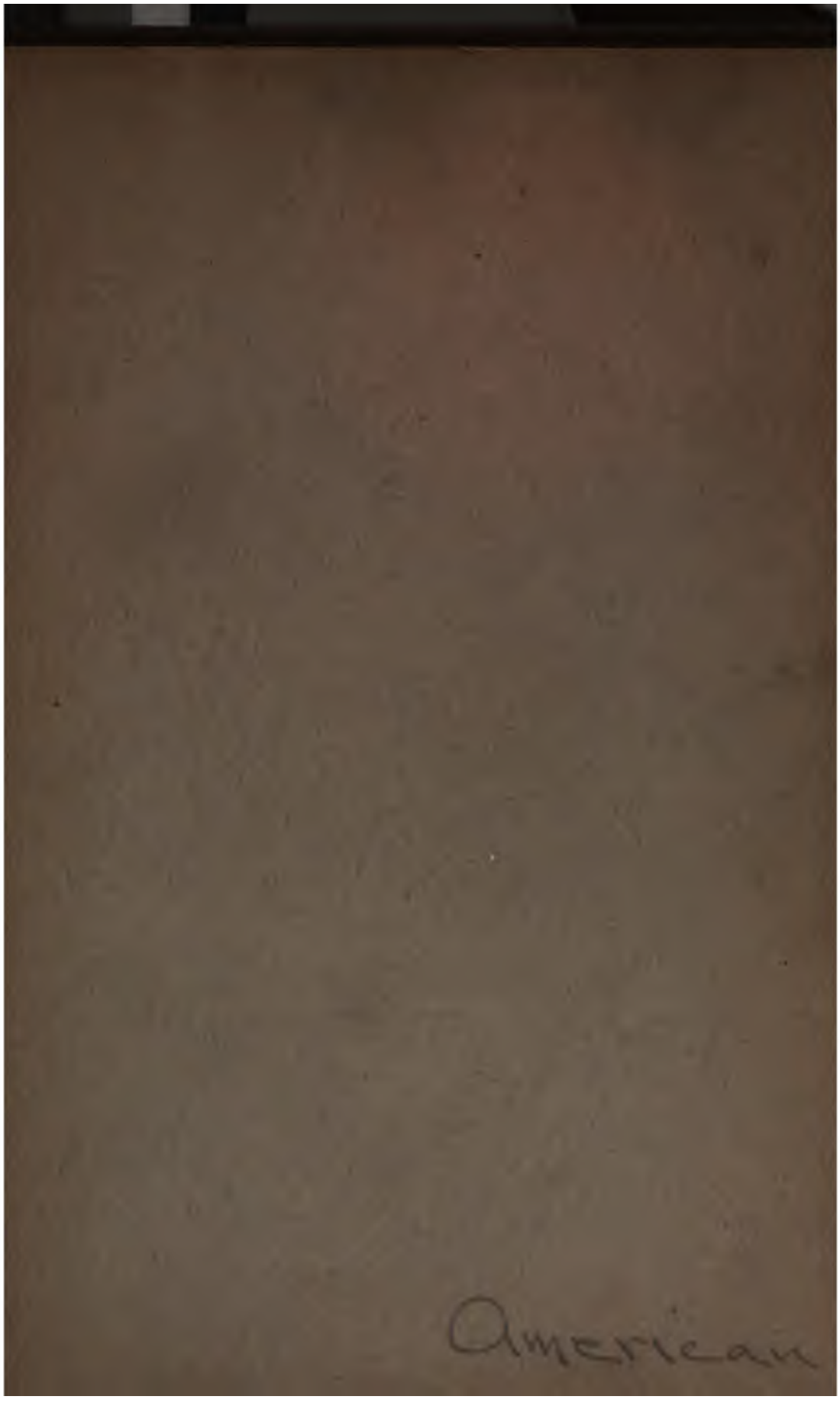
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ERRATA.

Page 38, second formula, in left hand column, should read $y - \sqrt{(a+ax)^2+hx^2}$.

Page 70, second line, should read "the black which is to be painted" instead of "the flat which is to be painted."

Page 85, eleventh line, should read "uneven number of panels" instead of "even number of panels."

American.
VEH.

AMERICAN BRIDGE COMPANY

STANDARDS

FOR

STRUCTURAL DETAILS

1901

ENGINEERING DEPARTMENT,

C. C. SCHNEIDER,
Vice-President

PAUL L. WOLFEL,
Chief Engineer

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NOTE.

All shapes are those manufactured by the A. & P. Roberts Co. Pencoyd Iron Works.

For Carnegie Steel Co.'s shapes see Appendix.

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PREFACE.

In order to obtain uniformity in the work done at the various plants of the American Bridge Company, it has been deemed advisable to prepare a system of standards for use in every engineering office to asssist the engineers and draughtsmen in making detail and shop drawings.

These standards are the result of years of experience. They have been revised from time to time in order to keep pace with the progress made in the art of designing, and particular attention has been paid to have them adapted to the latest improvements in tools used in bridge construction. They also contain such useful tables and information as will be found convenient in every engineering office where steelwork is being designed.

This present edition is a revision of former standards. Before finally adopting the same as the standards of the American Bridge Company, the engineers of the different plants were consulted and their suggestions incorporated, so that these standards, as now presented, are applicable to steel structures of all kinds.

Pencoyd, September, 1901.

C. C. Schneider,
Vice-President.

Paul L. Wolfel,
Chief Engineer.

18 X 20

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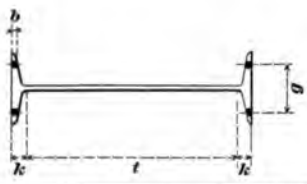
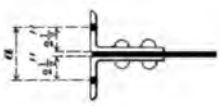
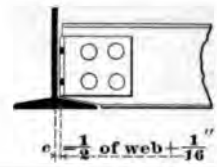
BEAMS.

Weights, dimensions, framing etc., etc.



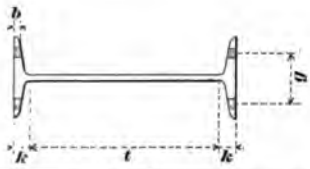


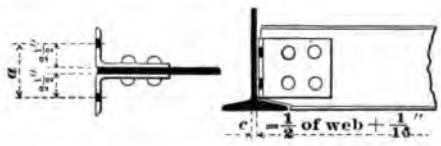


SIZE OF BEAM	WEIGHT PER FOOT	FLGE.	WEB	GAUGE	TANG'T	DIST.	GRIP	MAX. RIVET OR BOLT.	BEARING ON WALL	WALL PL.	STANDARD FRAMING	DIST.	DIST.	WEIGHT PER FOOT	SIZE OF BEAM
INCHES	POUNDS	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES			INCHES	INCHES	POUNDS	INCHES
	100.0	7 1/4	3/4	4	20 3/4	1 5/8	7/8			16" × 1" × 1'-4" # 73	24"	5 3/4	7/16	100.0	
	95.0	7 3/16	11/16	"	"	"	"					5 11/16	7/16	95.0	
*24	90.0	7 1/8	5/8	"	"	"	"	1	16			5 5/8	3/8	90.0	24
	85.0	7 1/16	9/16	"	"	"	"					5 9/16	3/8	85.0	
	80.0	7	1/2	"	"	"	"					5 1/2	5/16	80.0	
	100.0	7 1/32	7/8	"	16 1/4	1 7/8	15/16			16" × 1" × 1'-4" # 73	2-L 4" × 4" × 7/16" × 1'-6" Wt. 37#	5 7/8	1/2	100.0	
	95.0	6 15/16	29/32	"	"	"	"					5 13/16	7/16	95.0	
	90.0	6 7/8	29/32	"	"	"	"					5 3/4	7/16	90.0	
	85.0	6 29/32	11/16	"	"	"	"					5 11/16	7/16	85.0	
20	80.0	6 3/4	5/8	"	16 1/2	1 3/4	7/8	7/8	16			5 5/8	3/8	80.0	20
	75.0	6 3/4	5/8	"	"	"	"					5 5/8	3/8	75.0	
	70.0	6 5/32	5/16	"	17	1 1/2	3/4					5 9/16	3/8	70.0	
	65.0	6 1/4	1/2	"	"	"	11/16					5 1/2	5/16	65.0	
	90.0			3 3/4							18" and 20"			90.0	
	85.0			"										85.0	
	80.0			"										80.0	
	75.0	6 23/32	21/32	"	14 1/2	1 3/4	15/16			16" × 1" × 1'-4" # 73		5 11/16	3/8	75.0	
18	70.0	6 1/2	9/16	"	"	"	3/4	7/8	16			5 9/16	3/8	70.0	18
	65.0	6 1/4	9/16	"	"	"	"					5 9/16	3/8	65.0	
	60.0	6 7/32	17/32	"	15	1 1/2	11/16					5 9/16	5/8	60.0	
	55.0	6	15/32	"	"	"	"				2-L 4" × 4" × 7/16" × 1'-3" Wt. 31#	5 1/2	5/16	55.0	
	80.0	6 5/8	27/32	"	11 1/2	1 5/8	15/16					5 7/8	1/8	80.0	
	75.0	6 17/32	25/32	"	"	"	"					5 3/4	7/16	75.0	
	70.0	6 7/16	5/8	"	"	"	"					5 5/8	3/8	70.0	
	65.0	6 5/32	21/32	"	11 3/4	1 5/8	3/4					5 11/16	3/8	65.0	
15	60.0	6 1/8	1/2	"	"	"	"	3/4	12	12" × 3/4" × 1'-4" # 41	15"	5 1/2	5/16	60.0	15
	55.0	6 1/8	1/2	3 1/2	12	1 1/2	11/16					5 1/2	5/16	55.0	
	50.0	5 13/16	1/2	"	"	"	"					5 1/2	5/16	50.0	
	45.0	5 17/32	7/16	"	12 1/2	1 1/4	9/16					5 7/16	5/16	45.0	
	42.0	5 1/2	13/32	"	"	"	"				2-L 6" × 4" × 7/16" × 0'-10" Wt. 27#	5 7/16	1/4	42.0	
	65.0	6	13/16	"	8 3/4	1 1/8	7/8					5 13/16	1/2	65.0	
	60.0	5 7/8	11/16	"	"	"	"					5 11/16	7/16	60.0	
	55.0	5 3/4	9/16	"	"	"	"					5 9/16	3/8	55.0	
12	50.0	5 11/16	9/16	"	9	1 1/8	3/4	3/4	12	12" × 3/4" × 1'-0" # 31	12"	5 9/16	3/8	50.0	12
	45.0	5 3/8	5/16	3	9 1/4	1 3/8	11/16					5 9/16	5/16	45.0	
	40.0	5 1/4	7/16	"	"	"	"					5 7/16	5/16	40.0	
	35.0	5 5/32	7/16	"	9 3/4	1 1/8	1/2				2-L 6" × 4" × 7/16" × 0'-7 1/2" Wt. 20#	5 7/16	5/16	35.0	
	31.5	5	11/32	"	"	"	"					5 3/8	1/4	31.5	

BEAMS

Weights, dimensions, framing etc., etc.





SIZE OF BEAM	WEIGHT PER FT.	FLGE.	WEB	GAUGE	TANG'T	DIST.	GRIP	MAX. RIVET OR BOLT	BEARING ON WALL	WALL PL.	STANDARD FRAMING	DIST.	DIST.	WEIGHT PER FT.	SIZE OF BEAM
				g	*t*	*k*	*b*					*a*	*c*		
INCHES	POUNDS	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES			INCHES	INCHES	POUNDS	INCHES
10	40.0	5 7/32	9/16	3	7 1/2	1 1/4	5/8	3/4	8	8" x 5/8" x 1'-0" 17#	7", 8", 9", & 10"	5 9/16	3/8	40.0	*10*
	35.0	4 29/32	1/2	2 3/4	"	"	9/16					5 1/2	5/16	35.0	
	30.0	4 25/32	7/16	"	8	1	1/2					5 7/16	5/16	30.0	
	25.0	4 21/32	5/16	"	"	"	7/16					5 5/16	1/4	25.0	
9	35.0	4 7/8	9/16	"	6 1/2	1 1/4	5/8	3/4	8			5 9/16	3/8	35.0	*9*
	30.0	4 3/4	15/32	"	"	"	"					5 7/16	1/4	30.0	
	25.0	4 7/16	3/8	2 1/2	7	1	7/16					5 3/8	1/4	25.0	
	21.0	4 11/32	9/32	"	"	"	"					5 5/16	5/16	21.0	
8	25.5	4 5/32	7/16	"	5 3/4	1 1/8	1/2	3/4	8	8" x 5/8" x 0-8" 12#		5 7/16	5/16	25.5	*8*
	23.0	4 3/16	7/16	"	6 1/4	7/8	7/16					5 7/16	5/16	23.0	
	20.5	4 1/16	11/32	2 1/4	"	"	"					5 3/8	1/4	20.5	
	18.0	4	1/4	"	"	"	"				2-L 6" x 4" x 7/16" x 0'-5" Wt. 14#	5 1/4	5/16	18.0	
7	20.0	3 27/32	7/16	"	5 1/4	7/8	3/8	5/8	8			5 7/16	5/16	20.0	*7*
	17.5	3 3/4	11/32	"	"	"	"					5 3/8	1/4	17.5	
	15.0	3 29/32	1/4	"	"	"	"					5 1/4	5/16	15.0	
6	17.25	3 5/16	15/32	2	4 1/2	3/4	3/8	5/8	6	6" x 1/2" x 0-6" 5#		5 1/2	5/16	17.25	*6*
	14.75	3 7/16	11/32	"	"	"	"					5 3/8	1/4	14.75	
	12.25	3 11/32	7/32	"	"	"	"				5" & 6"	5 1/4	5/16	12.25	
5	14.75	3 9/32	1/2	1 3/4	3 3/4	5/8	5/16	1/2	6		2-L 6" x 4" x 7/16" x 0'-3" for 6" Wt. 8#	5 1/2	5/16	14.75	*5*
	12.25	3 1/8	11/32	"	"	"	"				2-L " 0'-2 1/2" " 5" Wt. 7#	5 3/8	1/4	12.25	
	9.75	3	7/32	"	"	"	"					5 1/4	3/16	9.75	
4	10.5	2 27/32	3/8	1 1/2	2 3/4	5/8	5/16	1/2	6			5 3/8	1/4	10.5	*4*
	9.5	2 25/32	5/16	"	"	"	"					5 5/16	1/4	9.5	
	8.5	2 23/32	1/4	"	"	"	"					5 1/4	3/16	8.5	
	7.5	2 21/32	5/16	"	"	"	"				3" & 4"	5 5/16	3/16	7.5	
3	7.5	2 5/8	11/32	1 1/4	1 3/4	5/8	1/4	1/2	6		2-L 6" x 4" x 7/16" x 0'-2" Wt. 6#	5 3/8	1/4	7.5	*3*
	6.5	2 3/8	1/4	"	"	"	"					5 1/4	5/16	6.5	
	5.5	2 5/16	5/32	"	"	"	"					5 5/16	1/8	5.5	

All rivets in standard framing angles are 3/4" diam.

Weights of " " " include weight of shop rivets.

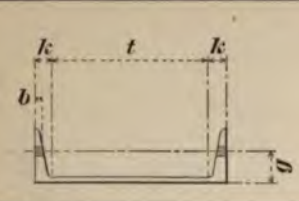
When beams frame opposite each other into another beam with web thickness less than 9/16" or where beams of short span lengths are loaded to their full capacity, it may be necessary to use framing angles of greater strength than the standards.

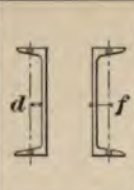
See table below for minimum span lengths.

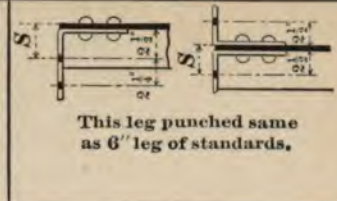
SIZE	WEIGHT	SPAN IN FT.	SIZE	WEIGHT	SPAN IN FT.	SIZE	WEIGHT	SPAN IN FT.	SIZE	WEIGHT	SPAN IN FT.	SIZE	WEIGHT	SPAN IN FT.	SIZE	WEIGHT	SPAN IN FT.	SIZE	WEIGHT	SPAN IN FT.
24	80.0	22.0	18	70.0	16.5	15	70.0	18.0	12	50.0	14.0	10	35.0	12.0	8	18.0	5.5	5	9.75	4.0
20	80.0	21.0	"	55.0	14.0	"	60.0	15.5	"	40.0	11.5	"	25.0	9.0	7	15.0	4.0	4	7.5	3.0
"	65.0	18.0				"	42.0	11.0	"	31.5	9.0	9	21.0	7.0	6	12.25	3.0	3	5.5	2.0

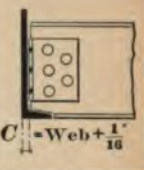
CHANNELS.

Weights. dimensions framing etc.. etc.





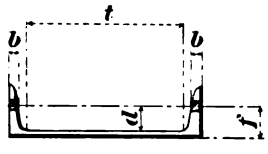




SIZE OF CHANNEL INCHES	WEIGHT PER FT. POUNDS	FLANGE INS.	WEB INS.	GAUGE *g* INS.	TANG'T *t* INS.	DIST. *k* INS.	GRIP *b* INS.	MAX. RIVET OR BOLT. INS.	DIST. *d* INCHES	GAUGE *f* INCHES	DIST. *S* INCHES	DIST. *C* INCHES	WEIGHT PER FT. POUNDS	SIZE OF CHANNEL INCHES
	55.0	4 3/32	23/32	2 1/2	12	1 1/2	3/4		1 3/4	2 15/32	3 1/4	13/16	55.0	
	50.0	4	5/8	"	"	"	"		"	2 9/16	3 1/8	11/16	50.0	
15	45.0	3 5/8	"	2	12 1/4	1 3/8	5/8	3/4	1 5/8	2 1/4	3 1/8	11/16	45.0	15
	40.0	3 17/32	17/32	"	"	"	"		"	2 9/32	3 1/16	5/8	40.0	
	35.0	3 7/16	7/16	"	"	"	"		"	2 1/16	2 15/16	1/2	35.0	
	33.0	3 13/32	15/32	"	"	"	"		"	2 1/32	2 15/16	1/2	33.0	
	40.0	3 5/16	5/8	"	9	1 1/2	3/4		1 1/2	2 1/8	3 1/8	11/16	40.0	
	35.0	3 3/16	1/2	"	"	"	"		"	2	3	9/16	35.0	
12	30.0	3 5/32	"	1 3/4	10	1	1/2	3/4	1 3/8	1 7/8	3	9/16	30.0	12
	25.0	3 1/16	13/32	"	"	"	"		"	1 31/32	2 15/16	1/2	25.0	
	20.5	2 15/16	9/32	"	"	"	"		"	1 21/32	2 15/16	3/8	20.5	
	35.0	3 7/32	3/4	"	7 3/4	1 1/8	"		1 1/4	2	3 1/4	15/16	35.0	
	30.0	3 1/16	19/32	"	"	"	"		"	1 27/32	3 1/8	11/16	30.0	
10	25.0	2 29/32	7/16	"	"	"	"	3/4	"	1 11/16	2 15/16	1/2	25.0	10
	20.0	2 11/16	3/8	1 1/2	8	1	7/16		"	1 5/8	2 7/8	7/16	20.0	
	15.0	2 9/16	1/4	"	"	"	"		"	1 1/2	2 3/4	3/16	15.0	
	25.0	2 7/8	17/32	"	7	"	1/2		1 1/8	1 31/32	3 1/16	5/8	25.0	
	20.0	2 29/32	3/8	"	"	"	"		"	1 1/2	2 7/8	7/16	20.0	
9	15.0	2 5/8	9/32	1 5/8	7 1/4	7/8	7/16	3/4	"	1 13/32	2 15/16	3/8	15.0	9
	13.25	2 7/16	1/4	"	"	"	"		"	1 3/8	2 3/4	5/16	13.25	
	21.25	2 3/4	17/32	1 1/2	6	1	"		"	1 21/32	3 1/16	5/8	21.25	
	18.75	2 21/32	7/16	"	"	"	"		"	1 9/16	2 15/16	1/2	18.75	
8	16.25	2 9/16	11/32	"	"	"	"	3/4	"	1 15/32	2 7/8	7/16	16.25	8
	13.75	2 11/32	5/16	1 3/8	6 1/4	7/8	3/8		1 1/16	1 5/8	2 15/16	3/8	13.75	
	11.25	2 1/4	7/32	"	"	"	"		"	1 9/32	2 3/4	5/16	11.25	
	19.75	2 21/32	9/16	1 1/2	5 1/4	"	7/16		"	1 5/8	3 1/16	5/8	19.75	
	17.25	2 9/16	15/32	"	"	"	"		"	1 17/32	3	9/16	17.25	
7	14.75	2 7/16	7/16	"	"	"	"	5/8	"	1 7/16	2 7/8	7/16	14.75	7
	12.25	2 5/16	13/32	1 1/4	5 1/8	3/4	3/8		"	1 3/8	2 15/16	3/8	12.25	
	9.75	2 5/32	7/32	"	"	"	"		"	1 9/32	2 3/4	5/16	9.75	
	15.50	2 5/8	17/32	"	4 1/2	"	"		1	1 17/32	3 1/16	5/8	15.50	
	13.00	2 1/4	13/32	"	"	"	"		"	1 15/32	2 15/16	1/2	13.00	
6	10.50	2 1/8	3/8	"	"	"	"	5/8	"	1 9/32	2 13/16	9/16	10.50	6
	8.00	1 29/32	5/16	1 1/8	"	"	5/16		"	1 3/16	2 11/16	1/4	8.00	
	11.50	2 1/32	15/32	"	3 1/2	"	"		7/8	1 11/32	3	9/16	11.50	
5	9.00	1 7/8	3/8	"	"	"	"	1/2	"	1 5/16	2 15/16	1/2	9.00	5
	6.50	1 3/4	5/16	"	"	"	"		"	1 1/16	2 11/16	7/16	6.50	
	7.25	1 29/32	11/32	1	2 3/4	5/8	1/4		3/4	1 3/32	2 7/8	7/16	7.25	
4	6.25	1 11/16	1/4	"	"	"	"	1/2	"	1	2 3/4	5/16	6.25	4
	5.25	1 5/8	5/16	"	"	"	"		"	15/16	2 11/16	1/4	5.25	
	6.0	1 15/32	11/32	7/8	1 3/4	"	"		5/8	31/32	2 7/8	7/16	6.0	
3	5.0	1 1/2	1/4	"	"	"	"	1/2	"	7/8	2 3/4	5/16	5.0	3
	4.0	1 13/32	5/32	"	"	"	"		"	25/32	2 11/16	1/4	4.0	

CHANNELS.

Weights, Areas, Dimensions, etc., etc.

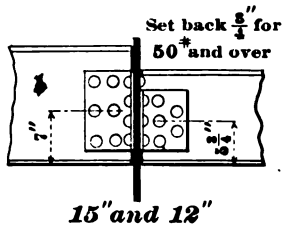


CHANNEL	SECTION	AREA	FLANGE	WEB	WEIGHT PER FT.	DIST.	GAUGE	TANG'T	GRIP	MAX. RIVET OR BOLT	MAX. RIVET OR BOLT	GRIP	TANG'T	GAUGE	DIST.	WEIGHT PER FT.	WEB	FLANGE	AREA	SECTION	SIZE OF CHANNEL
INS.		SQ. INS.	INS.	INS.	LBS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	LBS.	INS.	INS.	SQ. INS.		INS.
		20.3	$4\frac{3}{6}$	1	69.0		$2\frac{3}{4}$							2		35.1	$\frac{3}{4}$	$3\frac{7}{32}$	10.3		
		19.4	$4\frac{5}{16}$	$\frac{15}{16}$	65.8		$2\frac{11}{16}$							$1\frac{15}{16}$		33.0	$\frac{11}{16}$	$3\frac{5}{32}$	9.7		
	HEAVY	18.4	$4\frac{1}{4}$	$\frac{7}{8}$	62.7		$2\frac{5}{8}$							$1\frac{7}{8}$		30.9	$\frac{5}{8}$	$3\frac{3}{32}$	9.1	HEAVY	
		17.5	$4\frac{3}{16}$	$\frac{13}{16}$	59.5	$1\frac{3}{4}$	$2\frac{9}{16}$	12	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$7\frac{3}{4}$	$1\frac{13}{16}$	$1\frac{1}{4}$	28.7	$\frac{9}{16}$	$3\frac{1}{32}$	8.5		
		16.6	$4\frac{1}{8}$	$\frac{3}{4}$	56.8		$2\frac{1}{2}$							$1\frac{3}{4}$		26.6	$\frac{1}{2}$	$2\frac{31}{32}$	7.8		
		15.6	$4\frac{1}{16}$	$\frac{11}{16}$	53.1		$2\frac{7}{16}$							$1\frac{11}{16}$		24.5	$\frac{7}{16}$	$2\frac{29}{32}$	7.2		10
15		14.8	4	$\frac{5}{8}$	50.0		$2\frac{3}{8}$														
		14.3	$3\frac{11}{16}$	$\frac{11}{16}$	48.6		$2\frac{5}{16}$							$1\frac{11}{16}$		22.0	$\frac{7}{16}$	$2\frac{25}{32}$	6.5		
		13.4	$3\frac{5}{8}$	$\frac{5}{8}$	45.0		$2\frac{1}{4}$							$1\frac{5}{8}$		20.0	$\frac{3}{8}$	$2\frac{23}{32}$	5.9		
	LIGHT	12.4	$3\frac{9}{16}$	$\frac{9}{16}$	42.2	$1\frac{5}{8}$	$2\frac{3}{16}$	$12\frac{1}{4}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{7}{16}$	8	$1\frac{9}{16}$	$1\frac{1}{4}$	17.8	$\frac{5}{16}$	$2\frac{21}{32}$	5.2	LIGHT	
		11.5	$3\frac{1}{2}$	$\frac{1}{2}$	39.0		$2\frac{1}{8}$							$1\frac{1}{2}$		15.0	$\frac{1}{4}$	$2\frac{19}{32}$	4.5		
		10.5	$3\frac{7}{16}$	$\frac{7}{16}$	35.9		$2\frac{1}{16}$														
		9.6	$3\frac{13}{32}$	$\frac{13}{32}$	33.0		$2\frac{1}{32}$							$1\frac{13}{16}$		29.4	$\frac{11}{16}$	$3\frac{1}{32}$	8.7		
		14.3	$4\frac{3}{8}$	$\frac{3}{4}$	48.5		$2\frac{5}{8}$							$1\frac{3}{4}$		27.5	$\frac{5}{8}$	$2\frac{31}{32}$	8.1		
		13.5	$4\frac{5}{16}$	$\frac{11}{16}$	45.7		$2\frac{9}{16}$							$1\frac{11}{16}$		25.6	$\frac{9}{16}$	$2\frac{29}{32}$	7.5		
		12.6	$4\frac{1}{4}$	$\frac{5}{8}$	42.9		$2\frac{1}{2}$				$\frac{3}{4}$	$\frac{1}{2}$	7	$1\frac{5}{8}$	$1\frac{1}{8}$	23.7	$\frac{1}{2}$	$2\frac{27}{32}$	7.0	HEAVY	
13		11.8	$4\frac{3}{16}$	$\frac{9}{16}$	40.2	$1\frac{7}{8}$	$2\frac{7}{16}$	$10\frac{1}{2}$	$\frac{5}{8}$	$\frac{7}{8}$				$1\frac{9}{16}$		21.8	$\frac{7}{16}$	$2\frac{25}{32}$	6.4		9
		11.0	$4\frac{1}{8}$	$\frac{1}{2}$	37.4		$2\frac{3}{8}$							$1\frac{1}{2}$		19.9	$\frac{3}{8}$	$2\frac{23}{32}$	5.8		
		10.2	$4\frac{1}{16}$	$\frac{7}{16}$	34.7		$2\frac{5}{16}$							$1\frac{1}{2}$		17.8	$\frac{3}{8}$	$2\frac{19}{32}$	5.2		
		9.4	4	$\frac{3}{8}$	31.9		$2\frac{1}{4}$				$\frac{3}{4}$	$\frac{7}{16}$	$7\frac{1}{4}$	$1\frac{7}{16}$	$1\frac{1}{8}$	15.9	$\frac{5}{16}$	$2\frac{17}{32}$	4.7	LIGHT	
		16.3	$3\frac{11}{16}$	1	55.5		$2\frac{1}{2}$							$1\frac{3}{8}$		14.0	$\frac{1}{4}$	$2\frac{15}{32}$	4.1		
		15.6	$3\frac{5}{8}$	$\frac{15}{16}$	52.9		$2\frac{7}{16}$							$1\frac{11}{32}$		12.25	$\frac{7}{32}$	$2\frac{7}{16}$	3.9		
		14.8	$3\frac{9}{16}$	$\frac{7}{8}$	50.4		$2\frac{3}{8}$							$1\frac{5}{8}$		20.8	$\frac{1}{2}$	$2\frac{23}{32}$	6.1		
		14.1	$3\frac{1}{2}$	$\frac{13}{16}$	47.8		$2\frac{5}{16}$							$1\frac{9}{16}$		19.1	$\frac{7}{16}$	$2\frac{21}{32}$	5.6		
		13.3	$3\frac{7}{16}$	$\frac{3}{4}$	45.3		$2\frac{1}{4}$				$\frac{3}{4}$	$\frac{7}{16}$	6	$1\frac{1}{2}$	$1\frac{1}{8}$	17.4	$\frac{3}{8}$	$2\frac{19}{32}$	5.1	HEAVY	
		12.6	$3\frac{3}{8}$	$\frac{11}{16}$	42.7	$1\frac{1}{2}$	$2\frac{3}{16}$	9	$\frac{3}{4}$	$\frac{7}{8}$				$1\frac{7}{16}$		15.7	$\frac{5}{16}$	$2\frac{17}{32}$	4.6		8
		11.8	$3\frac{5}{16}$	$\frac{5}{8}$	40.2		$2\frac{1}{8}$							$1\frac{3}{8}$		14.0	$\frac{5}{16}$	$2\frac{11}{32}$	4.1		
12		11.1	$3\frac{1}{4}$	$\frac{9}{16}$	37.6		$2\frac{1}{16}$				$\frac{3}{4}$	$\frac{3}{8}$	$6\frac{1}{4}$	$1\frac{5}{16}$	$1\frac{1}{16}$	12.3	$\frac{1}{4}$	$2\frac{9}{32}$	3.6	LIGHT	
		10.3	$3\frac{3}{16}$	$\frac{1}{2}$	35.1		2							$1\frac{9}{32}$		11.25	$\frac{7}{32}$	$2\frac{1}{4}$	3.4		
		9.6	$3\frac{1}{8}$	$\frac{7}{16}$	32.5		$1\frac{15}{16}$														
		8.7	$3\frac{5}{32}$	$\frac{1}{4}$	29.4		$1\frac{7}{8}$														
		7.9	$3\frac{3}{32}$	$\frac{7}{16}$	26.9		$1\frac{13}{16}$														
	LIGHT	7.2	$3\frac{1}{32}$	$\frac{3}{8}$	24.3	$1\frac{3}{8}$	$1\frac{3}{4}$	10	$\frac{1}{2}$	$\frac{3}{4}$											
		6.4	$2\frac{31}{32}$	$\frac{5}{16}$	21.8		$1\frac{11}{16}$														
		6.0	$2\frac{15}{16}$	$\frac{9}{32}$	20.5		$1\frac{21}{32}$														

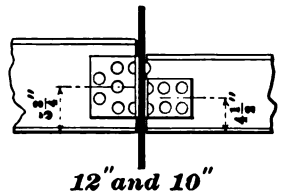
These weights are used in Bridge Work for chords, posts, etc.
When ordering from Mill give weight and section of [
8 - 13" x 26.9# [(Light Section) 33'-4"

BEAMS

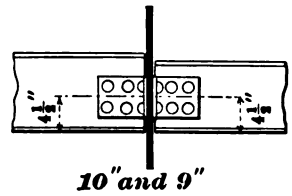
Connections for beams of different depths.
(framing opposite)



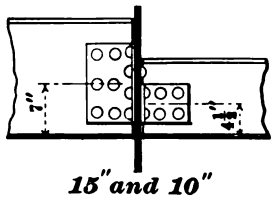
15" and 12"



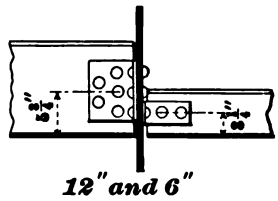
12" and 10"
12" and 9"
12" and 8"



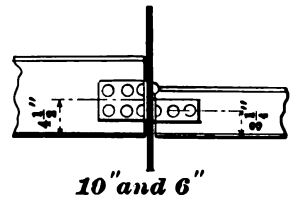
10" and 9"
10" and 8"
9" and 8"



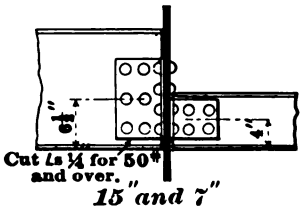
15" and 10"
15" and 9"
15" and 8"



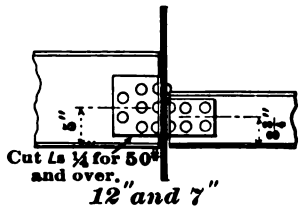
12" and 6"



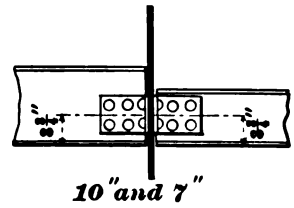
10" and 6"
9" and 6"
8" and 6"



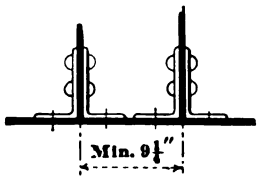
15" and 7"

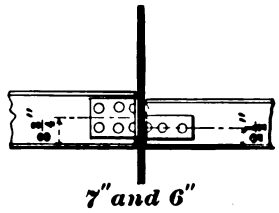


12" and 7"

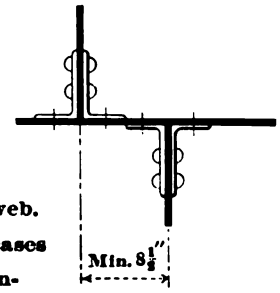


10" and 7"
9" and 7"
8" and 7"



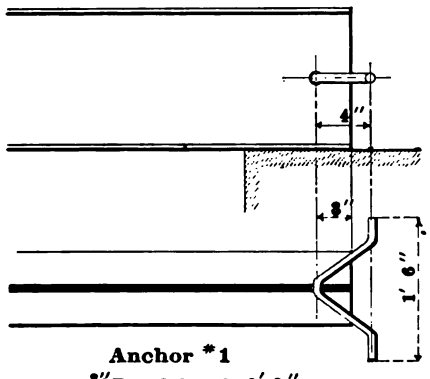


7" and 6"



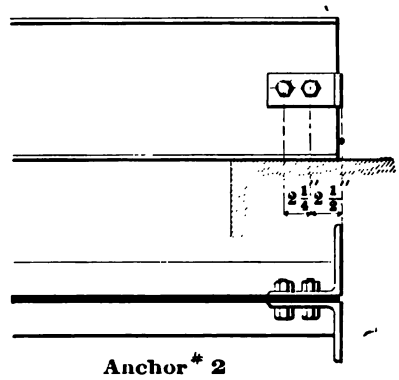
Use standard gauge ($2\frac{1}{2}$") in connection L^8 on beam with lightest web.
The first hole in connection L^8 is $3\frac{1}{4}$" from bottom of beam in all cases except when a 7" beam frames opposite in which case the connection is special.

ANCHORS



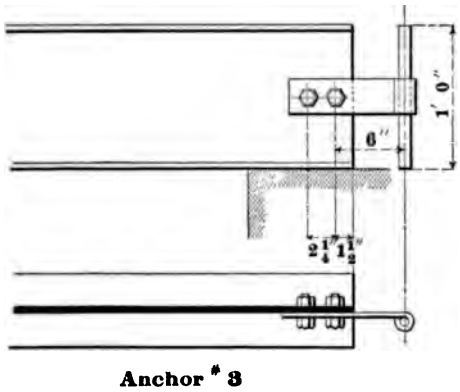
Anchor # 1

$\frac{3}{4}$″ Round, length 2′ 0″



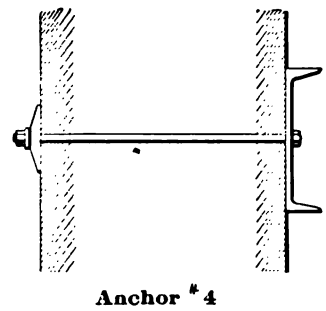
Anchor # 2

2 *L*• 6″ x 6″ x $\frac{1}{16}$″ x 0′ 3″ Bolted infield, $\frac{3}{4}$″ Bolts.



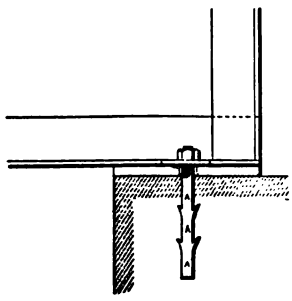
Anchor # 3

$\frac{3}{4}$″ Round, length 1′ 0″
⅜″ x $\frac{3}{8}$″ Flat " 1′ 1″
} Bolted infield, $\frac{3}{4}$″ Bolts.



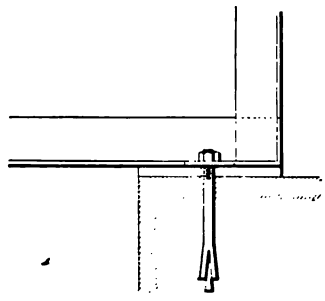
Anchor # 4

$\frac{3}{4}$″ Bolt. Plain, square washer or Cast Iron Rosette.



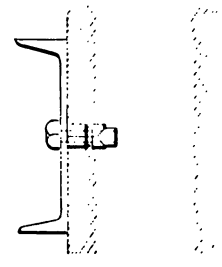
Hacked Bolt.

Size and length of bolts variable.



Split Bolt.

Punch holes $\frac{2}{8}$″ larger than size of bolts.

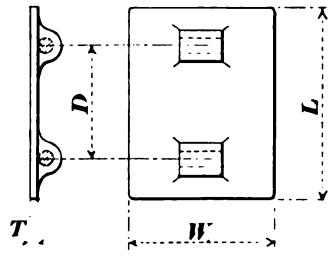


Expansion Bolt.

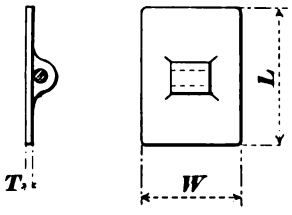
In ordering, give Metal to be fastened, also Diam. and length of Bolt.

SEPARATORS.

All Dimensions in Inches.



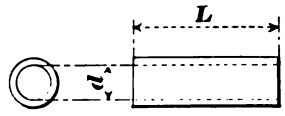
Cast Iron



SIZE OF BEAM	STANDARD DIMENSIONS				WEIGHTS				SIZE OF BEAM
	DISTANCE BETWEEN HOLES *D*	MIN. WIDTH OF SEPARATOR *W*	LENGTH OF SEPARATOR *L*	THICKNESS *T*	SEPARATOR	INCR. IN WT. OF SEPARATOR FOR 1" ADDIT'L SPREAD OF I	BOLTS AND NUTS	INCR. IN WT. OF BOLTS FOR 1" ADDIT'L SPREAD OF I	
24	12	$6\frac{3}{4}$	20	$\frac{5}{8}$	28.00	4.50	2.84	.248	*24*
20	12	6	16	"	23.00	3.20	2.70	"	*20*
18	9	$5\frac{3}{4}$	14	"	21.00	2.75	2.60	"	*18*
15	$7\frac{1}{2}$	$5\frac{1}{2}$	$11\frac{1}{2}$	$\frac{1}{2}$	14.75	1.80	2.40	"	*15*
12	5	5	$8\frac{3}{4}$	"	9.75	1.50	2.28	"	*12*
10	One Hole	$4\frac{3}{4}$	$7\frac{1}{2}$	"	6.50	1.25	1.08	.124	*10*
9	"	$4\frac{1}{4}$	$6\frac{1}{2}$	"	5.75	1.10	1.04	"	*9*
8	"	4	$5\frac{1}{2}$	"	4.50	1.00	1.01	"	*8*
7	"	$3\frac{1}{2}$	5	"	3.75	.75	0.95	"	*7*
6	"	$3\frac{1}{4}$	$4\frac{1}{2}$	"	2.25	.60	0.93	"	*6*

Bolts $\frac{3}{4}$" diam.

Beams should be spread so that width of separator "*W*" comes in even quarters of an inch.



Gas-pipe

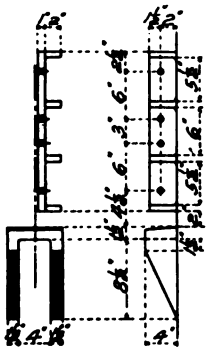
SIZE OF BEAM	STANDARD DIMENSIONS				WEIGHTS				SIZE OF BEAM
		MIN. LENGTH OF SEPARATOR *L*	NOMINAL DIAMETER OF PIPE *d*		SEPARATOR	INCR. IN WT. OF SEPARATOR FOR 1" ADDIT'L SPREAD OF I	BOLTS AND NUTS	INCR. IN WT. OF BOLT FOR 1" ADDIT'L SPREAD OF I	
5		3	$\frac{3}{4}$		.28	.1	.9	.124	*5*
4		$2\frac{3}{4}$	"		.26	"	.87	"	*4*
3		$2\frac{1}{4}$	"		.21	"	.82	"	*3*

Bolts $\frac{3}{4}$" diam.

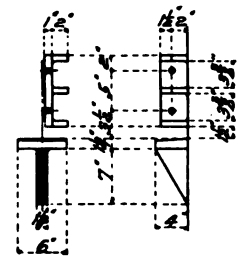
BEAMS.

Connections to Cast-iron Columns.

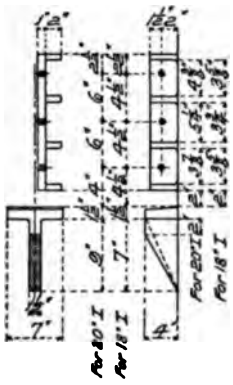
24"



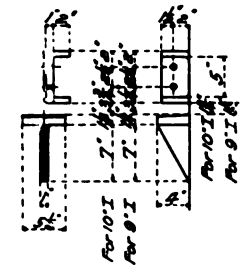
12"



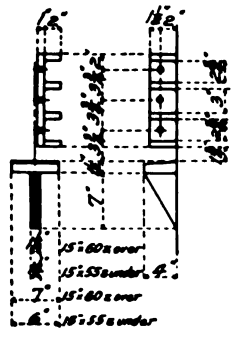
20" & 18"



10" & 9"



15"



All seats to slope ⅛".

All webs on lugs to be ¼" thick.

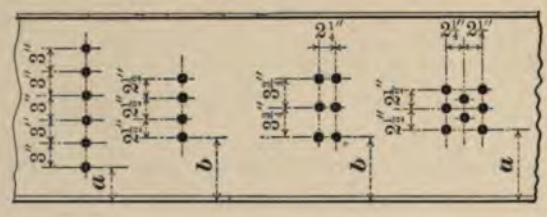
When the metal in the shaft of the column is of less thickness than that of the stiffener under seat, the shaft should be increased to same thickness as stiffener for a distance of 6" below to 6" above seat.

BEAMS AND CHANNELS.

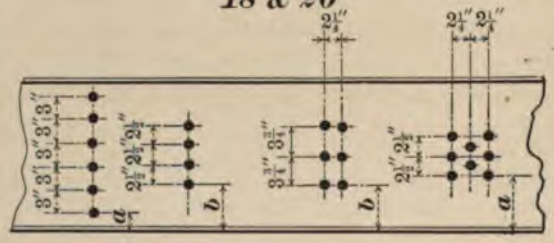
Standard Punching in Web.

SIZE OF BEAM	WEIGHT PER FT.	MIN. DIST. *a*	MIN. DIST. *b*
INCHES	LBS.	INCHES	INCHES
24	100.0	2½	3¼
	95.0	"	"
	90.0	"	"
	85.0	"	"
	80.0	"	"
20	100.0	2¾	3½
	95.0	"	"
	90.0	"	"
	85.0	"	"
	80.0	2⅛	3⅜
	75.0	"	"
	70.0	2⅜	3⅛
	65.0	"	"
18	90.0		
	85.0		
	80.0		
	75.0	2⅜	3⅜
	70.0	"	"
	65.0	"	"
	60.0	2¾	3⅛
	55.0	"	"
15	80.0	2⅜	3⅜
	75.0	"	"
	70.0	"	"
	65.0	2½	3¼
	60.0	"	"
	55.0	2⅜	3⅛
	50.0	"	"
	45.0	2⅛	2⅞
	42.0	"	"
12	65.0	2½	
	60.0	"	
	55.0	"	
	50.0	2⅜	
	45.0	2¼	
	40.0	"	
	35.0	2	
	31.5	"	

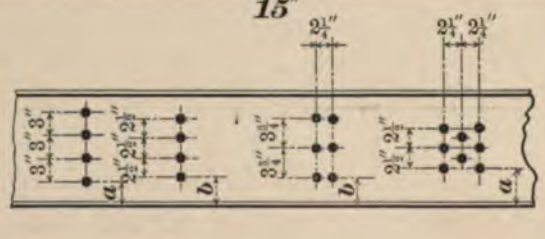
24″



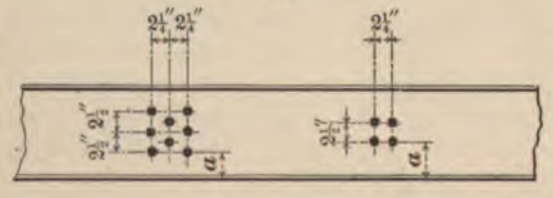
18″ & 20″



15″



12″



Holes shown in each group can be punched in one operation (at Pencoyd) and any desired hole can be omitted. 3 holes 3″ apart and 2 holes 3¾″ apart cannot be punched central in beam.

Min. dist. *a* will in the first case be 3″ plus amount given in table and min. dist. *b* will in second case be 3¾″ plus amount given in table.

Holes for Tie-Rods should be spaced 4½″ apart for 24″ to 12″ Beams.

MIN. DIST. *b*	MIN. DIST. *a*	WEIGHT PER FT.	SIZE OF CHANNEL
INCHES	INCHES	LBS.	INCHES
3⅜	2⅝	55.0	
"	"	50.0	
3	2¼	45.0	
"	"	40.0	15
"	"	35.0	
"	"	33.0	
	2⅝	40.0	
	"	35.0	12
	1⅞	30.0	
	"	25.0	
	"	20.5	

BEAMS AND CHANNELS.

Standard Punching in Web.

SIZE OF BEAM	WEIGHT PER FT.	MIN. DIST. *a*		MIN. DIST. *a*	WEIGHT PER FT.	SIZE OF CHANNEL
INCHES	LBS.	INCHES		INCHES	LBS.	INCHES
			10	2	35.0	
	40.0	$2\frac{1}{8}$		"	30.0	
10	35.0	"		"	25.0	***10***
	30.0	$1\frac{7}{8}$		$1\frac{7}{8}$	20.0	
	25.0	"		"	15.0	
	35.0	$2\frac{1}{8}$		$1\frac{7}{8}$	25.0	
9	30.0	"		"	20.0	***9***
	25.0	$1\frac{7}{8}$		$1\frac{3}{4}$	15.0	
	21.0	"	***9", 8" & 7"***	"	13.25	
				$1\frac{7}{8}$	21.25	
	25.5	2		"	18.75	
8	23.0	$1\frac{3}{4}$		"	16.25	***8***
	20.5	"		$1\frac{3}{4}$	13.75	
	18.0	"		"	11.25	
				$1\frac{3}{4}$	19.75	
				"	17.25	
7	20.0	$1\frac{5}{8}$		"	14.75	***7***
	17.5	"		$1\frac{5}{8}$	12.25	
	15.0	"		"	9.75	
			6", 5", 4" & 3"	$1\frac{5}{8}$	15.50	
	17.25	$1\frac{5}{8}$		"	13.00	
6	14.75	"		"	10.50	***6***
	12.25	"		"	8.00	
	14.75	$1\frac{1}{2}$		$1\frac{5}{8}$	11.50	
5	12.25	"		"	9.00	***5***
	9.75	"		"	6.50	
	10.5	$1\frac{1}{2}$		$1\frac{1}{2}$		
	9.5	"		"	7.25	
4	8.5	"		"	6.25	***4***
	7.5	"		"	5.25	
	7.5	$1\frac{1}{2}$		$1\frac{1}{2}$	6.0	
3	6.5	"		"	5.0	***3***
	5.5	"		"	4.0	

Holes shown in each group can be punched in one operation (at Pencoyd) and any desired hole can be omitted.

Holes for tie-rods should be spaced $2\frac{1}{4}$" apart for 10" to 8" beams.

ANGLES

Weight in pounds per foot.

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE
8 x 8							26.4	29.8	33.2	36.6	39.0	42.4	45.8	49.3	52.8	8 x 8
6 x 6					14.8	17.3	19.7	22.0	24.4	26.5	28.8	31.0	33.4	35.9		6 x 6
5 x 5					12.3	14.3	16.3	18.2	20.1	22.0	23.8	25.6	27.4	29.4		5 x 5
4 x 4				8.2	9.8	11.3	12.8	14.5	15.8	17.2	18.6					4 x 4
3½ x 3½				7.1	8.5	9.8	11.1	12.4	13.7							3½ x 3½
3 x 3			4.9	6.1	7.2	8.3	9.4	10.4	11.5							3 x 3
2¾ x 2¾			4.5	5.5	6.6	7.7	8.6									2¾ x 2¾
2½ x 2½		3.1	4.1	5.0	5.9	6.9	7.8									2½ x 2½
2¼ x 2¼		2.7	3.6	4.5	5.4											2¼ x 2¼
2 x 2		2.5	3.2	4.0	4.8											2 x 2
1¾ x 1¾		2.1	2.8	3.5	4.1											1¾ x 1¾
1½ x 1½	1.2	1.8	2.4	2.9	3.5											1½ x 1½
1¼ x 1¼	1.0	1.5	2.0													1¼ x 1¼
1 x 1	0.8	1.2	1.5													1 x 1

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE
8 x 6							23.0	25.8	28.8	31.7	34.6	37.5	40.4	43.4	46.4	8 x 6
7 x 3½							17.0	19.0	21.0	23.0	24.8	26.7	28.6	30.5	32.5	7 x 3½
6 x 4					12.2	14.3	16.3	18.1	20.1	22.0	23.8	25.6	27.4	29.4		6 x 4
6 x 3½					11.6	13.6	15.5	17.1	19.0	20.8	22.6	24.5	26.5	28.6		6 x 3½
5 x 4					11.0	12.8	14.6	16.2	17.9	19.6	21.3					5 x 4
5 x 3½				8.7	10.3	12.0	13.6	15.2	16.8	18.4	20.0					5 x 3½
5 x 3				8.2	9.7	11.2	12.8	14.2	15.7	17.2	18.7					5 x 3
4 x 3½				7.7	9.1	10.5	11.9	13.3	14.7	16.0	17.4					4 x 3½
4 x 3				7.1	8.5	9.8	11.1	12.4	13.8							4 x 3
3½ x 3				6.6	7.8	9.1	10.3	11.6	12.9							3½ x 3
3½ x 2½			4.9	6.1	7.2	8.3	9.4									3½ x 2½
3 x 2½			4.5	5.5	6.6	7.7	8.7									3 x 2½
2½ x 2		2.7	3.6	4.5	5.4	6.2	7.0									2½ x 2
2 x 1½		2.1	2.9	3.6	4.3											2 x 1½
2 x 1¼		1.9	2.6	3.3	3.9											2 x 1¼

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE

Note: [**Indicates finishing rolls**

ANGLES

Actual size of legs

ZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE
x 8							8	8 1/16	8 1/8	8 3/16	8 1/16	8 1/8	8 3/16	8 1/4	8 5/16	8 x 8
x 6					6	6 1/16	6 1/8	6 5/16	6 1/4	6 1/16	6 1/8	6 3/16	6 1/4	6 5/16		6 x 6
x 5					5	5 1/16	5 1/8	5 1/16	5 1/8	5 3/16	5 1/4	5 5/16	5 3/8	5 7/16		5 x 5
x 4				4	4 1/16	4 1/8	4 1/16	4 1/8	4 3/16	4 1/4	4 5/16					4 x 4
x 3 1/2				3 1/2	3 5/16	3 3/8	3 5/16	3 3/8	3 11/16							3 1/2 x 3 1/2
x 3			3	3 1/16	3 1/8	3 3/16	3 1/4	3 5/16	3 3/8							3 x 3
x 2 3/4			2 3/4	2 13/16	2 7/8	2 15/16	3									2 3/4 x 2 3/4
x 2 1/2		2 1/2	2 5/16	2 3/8	2 11/16	2 3/4	2 15/16									2 1/2 x 2 1/2
x 2 1/4		2 1/4	2 3/16	2 3/8	2 7/16											2 1/4 x 2 1/4
x 2		2	2 1/16	2 1/8	2 3/16											2 x 2
x 1 3/4		1 3/4	1 13/16	1 7/8	1 15/16											1 3/4 x 1 3/4
x 1 1/2	1 1/2	1 5/16	1 3/8	1 11/16	1 3/4											1 1/2 x 1 1/2
x 1 1/4	1 1/4	1 3/16	1 3/8													1 1/4 x 1 1/4
x 1	1	1 1/16	1 1/8													1 x 1

ZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE
x 6							6	6 1/16	6 1/8	6 3/16	6 1/4	6 5/16	6 3/8	6 7/16	6 1/2	8 x 6
x 3 1/2							3 1/2	3 5/16	3 3/8	3 5/8	3 11/16	3 3/4	3 13/16	3 7/8	3 15/16	7 x 3 1/2
x 4					4	4 1/16	4 1/8	4 1/8	4 3/16	4 1/4	4 5/16	4 3/8	4 7/16	4 1/2		6 x 4
x 3 1/2					3 1/2	3 5/16	3 3/8	3 3/8	3 11/16	3 3/4	3 13/16	3 7/8	3 15/16	4		6 x 3 1/2
x 4					4	4 1/16	4 1/8	4 1/8	4 3/16	4 1/4	4 5/16					5 x 4
x 3 1/2				3 1/2	3 5/16	3 3/8	3 3/8	3 11/16	3 3/4	3 13/16	3 7/8					5 x 3 1/2
x 3				3	3 1/16	3 1/8	3 1/8	3 3/16	3 1/4	3 5/16	3 3/8					5 x 3
x 3 1/2				3 1/2	3 5/16	3 3/8	3 3/8	3 11/16	3 3/4	3 13/16	3 7/8					4 x 3 1/2
x 3				3	3 1/16	3 1/8	3 1/8	3 3/16	3 1/4							4 x 3
x 3				3	3 1/16	3 1/8	3 3/16	3 1/4	3 5/16							3 1/2 x 3
x 2 1/2			2 1/2	2 5/16	2 3/8	2 11/16	2 3/4									3 1/2 x 2 1/2
x 2 1/2			2 1/2	2 5/16	2 3/8	2 11/16	2 3/4									3 x 2 1/2
x 2		2	2 1/16	2 1/8	2 3/16	2 1/4	2 5/16									2 1/2 x 2
x 1 1/2		1 1/2	1 5/16	1 3/8	1 11/16											2 x 1 1/2
x 1 1/4		1 1/4	1 3/16	1 3/8	1 7/16											2 x 1 1/4

ZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE

Note: [**Indicates finishing rolls**

ANGLES

Area in square inches.

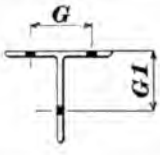
SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE
8 ×8							7.76	8.76	9.76	10.76	11.47	12.47	13.47	14.50	15.53	8 ×8
6 ×6					4.35	5.09	5.79	6.47	7.18	7.79	8.47	9.12	9.82	10.56		6 ×6
5 ×5					3.62	4.21	4.79	5.35	5.91	6.47	7.00	7.53	8.06	8.65		5 ×5
4 ×4				2.41	2.88	3.32	3.76	4.21	4.65	5.06	5.47					4 ×4
3½×3½				2.09	2.50	2.88	3.26	3.65	4.03							3½×3½
3 ×3			1.44	1.79	2.12	2.44	2.76	3.06	3.38							3 ×3
2¾×2¾			1.32	1.65	1.94	2.26	2.53									2¾×2¾
2½×2½		0.91	1.21	1.47	1.74	2.03	2.29									2½×2½
2¼×2¼		0.79	1.06	1.32	1.59											2¼×2¼
2 ×2		0.74	0.94	1.18	1.41											2 ×2
1¾×1¾		0.62	0.82	1.03	1.21											1¾×1¾
1½×1½	0.35	0.53	0.71	0.85	1.03											1½×1½
1¼×1¼	0.29	0.44	0.59													1¼×1¼
1 ×1	0.24	0.35	0.44													1 ×1

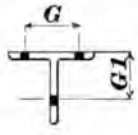
SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE
8 ×6							6.76	7.59	8.44	9.32	9.94	10.76	11.62	12.50	13.41	8 ×6
7 ×3½							5.00	5.59	6.18	6.76	7.29	7.85	8.41	8.97	9.56	7 ×3½
6 ×4					3.59	4.21	4.79	5.32	5.91	6.47	7.00	7.53	8.06	8.65		6 ×4
6 ×3½					3.41	4.00	4.56	5.03	5.59	6.12	6.65	7.21	7.79	8.41		6 ×3½
5 ×4					3.24	3.76	4.29	4.76	5.26	5.76	6.26					5 ×4
5 ×3½				2.56	3.03	3.53	4.00	4.47	4.94	5.41	5.88					5 ×3½
5 ×3				2.41	2.85	3.29	3.76	4.18	4.62	5.06	5.50					5 ×3
4 ×3½				2.26	2.68	3.09	3.50	3.91	4.32	4.71	5.12					4 ×3½
4 ×3				2.09	2.50	2.88	3.26	3.65	4.06							4 ×3
3½×3				1.94	2.29	2.68	3.03	3.41	3.79							3½×3
3½×2½			1.44	1.79	2.12	2.44	2.76									3½×2½
3 ×2½			1.32	1.62	1.94	2.26	2.56									3 ×2½
2½×2		0.79	1.06	1.32	1.59	1.82	2.06									2½×2
2 ×1½		0.62	0.85	1.06	1.26											2 ×1½
2 ×1¼		0.56	0.76	0.97	1.15											2 ×1¼

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE

TEES.

Weights, Areas, Dimensions, etc., etc.



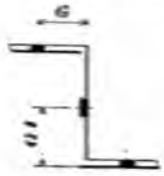


EVEN TEES										UNEVEN TEES									
SECTION NUMBER	SIZE	WEIGHT PER FOOT	AREA	FLANGE G			STEM G1			STEM G1			FLANGE G			AREA	WEIGHT PER FOOT	SIZE	SECTION NUMBER
				THICKNESS	GAUGE	MAX. RIVET	MAX. RIVET	GAUGE	THICKNESS	THICKNESS	GAUGE	MAX. RIVET	MAX. RIVET	GAUGE	THICKNESS				
	INCHES	LBS.	SQ. INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	SQ. INS.	LBS.	INCHES	
40T	4 ×4	10.9	3.10	7/16	2 1/2	5/8	7/8	2 1/2	7/16	1	3	7/8	7/8	3 3/4	3/4	8.21	28.2	6 ×4 1/2	66T
41T	4 ×4	13.7	3.98	9/16	2 1/2	5/8	7/8	2 1/2	9/16	1/2	2 1/2	7/8	7/8	3 1/2	1/2	4.61	15.6	6 ×4	64T
35T	3 1/2 ×3 1/2	7.0	2.08	11/32	2 1/4	1/2	7/8	2 1/8	11/32	1 5/16	3 1/2	1	7/8	4	1	11.58	39.0	6 ×5 1/4	65T
36T	3 1/2 ×3 1/2	9.0	2.65	7/16	2 1/4	1/2	7/8	2 1/8	7/16	3/4	2 1/4	7/8	3/4	3 1/4	1/2	4.95	17.0	5 ×3 1/2	53T
37T	3 1/2 ×3 1/2	11.0	3.24	1/2	2 1/4	1/2	7/8	2 1/8	1/2	1/2	2 1/2	7/8	3/4	3 1/4	9/16	4.54	15.3	5 ×4	54T
30T	3 ×3	6.5	1.91	3/8	1 7/8	1/2	7/8	1 7/8	3/8	3/8	1 3/8	5/8	3/4	2 1/2	3/8	1.93	6.5	4 ×2	42T
31T	3 ×3	7.7	2.27	7/16	1 7/8	1/2	7/8	1 7/8	7/16	7/16	1 7/8	7/8	3/4	2 1/2	7/16	2.67	9.0	4 ×3	43T
25T	2 1/2 ×2 1/2	5.0	1.47	11/32	1 5/8	3/8	5/8	1 3/4	11/32	1/2	1 7/8	7/8	3/4	2 1/2	1/2	3.05	10.2	4 ×3	44T
26T	2 1/2 ×2 1/2	5.8	1.71	13/32	1 5/8	3/8	5/8	1 3/4	13/32	3/4	2 1/4	7/8	3/4	3	1/2	4.65	15.8	4 1/2 ×3 1/2	46T
27T	2 1/2 ×2 1/2	6.6	1.94	15/32	1 5/8	3/8	5/8	1 3/4	15/32	7/16	2 3/4	7/8	3/4	2 1/2	7/16	3.38	11.4	4 ×4 1/2	47T
22T	2 1/4 ×2 1/4	4.0	1.18	5/16	1 3/8	3/8	5/8	1 1/2	1/4	9/16	2 3/4	7/8	3/4	2 1/2	5/16	4.29	14.6	4 ×4 1/2	45T
23T	2 1/4 ×2 1/4	4.0	1.18	5/16	1 3/8	3/8	5/8	1 1/2	5/16	5/8	1 7/8	7/8	5/8	2 1/4	3/8	2.11	7.0	3 1/2 ×3	38T
20T	2 ×2	3.5	1.03	5/16	1 1/4	3/8	1/2	1 3/8	5/16	7/16	1 7/8	7/8	5/8	2 1/4	7/16	2.46	8.5	3 1/2 ×3	39T
17T	1 3/4 ×1 3/4	2.4	0.71	1/4	1 1/8	1/4	1/2	1 1/4	1/4	5/16	1	1/2	1/2	2	1/4	1.20	4.0	3 ×1 1/2	30T
15T	1 1/2 ×1 1/2	2.0	0.59	1/4	1	1/4	3/8	1	1/4	5/16	1 5/8	3/4	1/2	2	5/16	1.46	5.0	3 ×2 1/2	31T
12T	1 1/4 ×1 1/4	1.5	0.44	1/4	15/16	1/4	1/4	7/8	1/4	3/8	1 5/8	3/4	1/2	2	3/8	1.76	6.0	3 ×2 1/2	32T
10T	1 ×1	1.0	0.29	1/4			1/4		1/4	7/16	1 1/2	3/4	1/2	2	7/16	2.06	7.0	3 ×2 1/2	33T
										7/16	1 1/2	3/4	1/2	2	7/16	2.38	8.0	3 ×2 1/2	34T
										7/16	2 1/4	7/8	1/2	2	7/16	2.46	8.3	3 ×3 1/2	35T
										1/2	2 1/4	7/8	1/2	2	1/2	2.81	9.5	3 ×3 1/2	36T
										5/16			3/8	1 7/8	5/16	1.96	6.6	2 3/4 ×1 3/4	28T
										5/16			3/8	1 7/8	5/16	2.14	7.2	2 3/4 ×2	29T
										5/16	7/8	3/8	3/8	1 5/8	5/16	0.97	3.3	2 1/2 ×1 1/4	25T
										3/8	1 7/8	7/8	3/8	1 5/8	3/8	1.68	5.7	2 1/2 ×2 3/4	26T
										3/8	2	7/8	3/8	1 5/8	3/8	1.76	6.0	2 1/2 ×3	27T
										1/4			3/8	1 3/8	1/4	0.66	2.2	2 1/4 × 9/16	24T
										1/4			3/8	1 1/4	1/4	0.60	2.0	2 × 9/16	20T
										1/4	3/4	1/4	3/8	1 1/8	1/4	0.62	2.0	2 ×1 1/16	22T
										1/4	3/4	1/4	3/8	1 1/8	1/4	0.72	2.5	2 ×1	21T
										5/16	1	3/8	3/8	1 1/8	5/16	0.91	3.0	2 ×1 1/2	23T
										1/4	13/16	1/4	1/4	1 1/8	1/4	0.56	1.9	1 3/4 ×1 1/16	17T
										7/16	13/16	1/4	1/4	1 1/8	7/16	1.04	3.5	1 3/4 ×1 1/4	18T
										3/16	5/8	1/4	1/4	7/8	3/16	0.41	1.4	1 1/2 × 15/16	15T
										1/4	5/8	1/4	1/4	3/4	1/4	0.35	1.2	1 1/4 × 15/16	12T

NOTE: In ordering Tees give size, weight and section number.
In giving size of Uneven Tees flange should be given first.

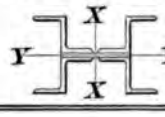
Z- BARS

Weights, areas, dimensions, etc., etc.



NOMINAL SIZE	THICKNESS	ACTUAL SIZE FLANGES & WEB	WEIGHT PER FOOT	AREA	GAUGE G	MAX. RIVETS G	MAX. RIVETS G1	GAUGE G1	THICKNESS	NOMINAL SIZE
INCHES	INCHES	INCHES	POUNDS	SQ. INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES
3	1/4	2 1/8 x 3 x 2 3/8	6.60	1.94	1 1/2	3/4	7/8	1 1/2	1/4	3
	5/16	2 5/16 x 3 1/16 x 2 5/16	8.29	2.44	"	"	"	"	5/16	
	3/8	2 1/2 x 3 1/8 x 2 1/4	10.00	2.94	"	"	"	"	3/8	
	7/16	2 5/16 x 3 x 2 5/16	11.15	3.25	1 1/2	"	"	"	7/16	
	1/2	2 3/4 x 3 1/16 x 2 1/4	12.75	3.75	"	"	"	"	1/2	
4	1/4	2 7/8 x 4 x 2 7/8	7.88	2.32	1 1/2	3/4	7/8	2	1/4	4
	5/16	2 15/16 x 4 1/16 x 2 15/16	9.89	2.91	"	"	"	"	5/16	
	3/8	3 x 4 1/8 x 3	11.90	3.52	"	"	"	"	3/8	
	7/16	3 x 4 x 3	13.46	3.96	1 7/8	"	"	"	7/16	
	1/2	3 1/16 x 4 1/16 x 3 1/16	15.50	4.56	"	"	"	"	1/2	
	9/16	3 1/8 x 4 1/8 x 3 1/8	17.54	5.16	"	"	"	"	9/16	
	5/8	3 1/16 x 4 x 3 1/16	18.80	5.55	2	"	"	"	5/8	
	11/16	3 1/8 x 4 1/16 x 3 1/8	20.87	6.14	"	"	"	"	11/16	
	3/4	3 5/16 x 4 1/8 x 3 5/16	22.95	6.75	"	"	"	"	3/4	
5	5/16	3 5/16 x 5 x 3 5/16	11.42	3.36	2	7/8	1 1/8	2 1/2	5/16	5
	3/8	3 1/2 x 5 1/16 x 3 1/2	13.77	4.05	"	"	"	"	3/8	
	7/16	3 5/16 x 5 1/8 x 3 5/16	16.15	4.75	"	"	"	"	7/16	
	1/2	3 1/2 x 5 x 3 1/2	17.78	5.23	"	"	"	"	1/2	
	9/16	3 5/16 x 5 1/16 x 3 5/16	20.09	5.91	"	"	"	"	9/16	
	5/8	3 1/2 x 5 1/8 x 3 1/2	22.44	6.60	"	"	"	"	5/8	
	11/16	3 1/2 x 5 x 3 1/2	23.66	6.96	2 1/2	"	"	"	11/16	
	3/4	3 5/16 x 5 1/16 x 3 5/16	25.97	7.64	"	"	"	"	3/4	
6	3/8	3 1/2 x 6 x 3 1/2	15.61	4.59	2 1/4	7/8	1 1/8	3	3/8	6
	7/16	3 5/16 x 6 1/16 x 3 5/16	18.32	5.39	"	"	"	"	7/16	
	1/2	3 1/2 x 6 1/8 x 3 1/2	21.05	6.19	"	"	"	"	1/2	
	9/16	3 1/2 x 6 x 3 1/2	22.71	6.68	"	"	"	"	9/16	
	5/8	3 5/16 x 6 1/16 x 3 5/16	25.36	7.46	"	"	"	"	5/8	
	11/16	3 1/2 x 6 1/8 x 3 1/2	28.05	8.25	"	"	"	"	11/16	
	3/4	3 1/2 x 6 x 3 1/2	29.37	8.64	"	"	"	"	3/4	
	13/16	3 5/16 x 6 1/16 x 3 5/16	31.89	9.33	"	"	"	"	13/16	
	7/8	3 1/2 x 6 1/8 x 3 1/2	34.54	10.16	"	"	"	"	7/8	

Z-BAR COLUMNS

Weights, areas,  **dimensions, etc., etc.**

SIZE OF COLUMN INS.	SIZE OF WEB PL.	SIZE OF Z-BARS: THICKNESS	SIZE OF Z-BARS: SIZE OF FLANGES	WIDTH *W*	GAUGE *g*	TANG'T *t*	STANDARD DIMENSIONS	AXIS X-X: MOMENT OF INERTIA	AXIS X-X: RADIUS OF GYRATION	AXIS Y-Y: MOMENT OF INERTIA	AXIS Y-Y: RADIUS OF GYRATION	WEIGHT PER FOOT	AREA IN SQ. IN.	SIZE OF COLUMN INS.
6	6" Web — SAME THICKNESS AS Z-BAR	1/4	2 7/8 x 3 x 2 9/16	6 1/4	1 3/16	5 9/16		84.7	3.0	31.7	1.8	31.5	9.26	
		5/16	2 11/16 x 3 1/16 x 2 11/16	6 7/16	1 7/16	5 7/16		105.1	3.0	41.8	1.9	39.6	11.64	
		3/8	2 3/4 x 3 1/16 x 2 3/4	6 5/8	1 1/2	5 1/8		125.1	2.9	53.4	1.9	47.6	14.01	
		7/16	2 11/16 x 3 x 2 11/16	6 7/16	1 9/16	4 15/16		134.6	2.9	55.2	1.8	53.5	15.63	
		1/2	2 3/4 x 3 1/16 x 2 3/4	6 5/8	1 5/8	4 7/8		153.1	2.9	67.1	1.9	61.2	18.00	
8	7" Web — SAME THICKNESS AS Z-BAR	1/4	2 7/8 x 4 x 2 7/8	8 1/4	1 5/16	7 1/8		134.7	3.4	65.7	2.4	37.5	11.03	
		5/16	2 15/16 x 4 1/16 x 2 15/16	8 7/16	1 11/16	7 3/16		166.9	3.4	85.8	2.4	47.0	13.83	
		3/8	3 x 4 1/16 x 3	8 5/8	1 3/4	7 1/4		199.4	3.4	107.8	2.5	56.5	16.71	
		7/16	3 x 4 x 3	8 7/8	1 15/16	6 15/16		220.6	3.4	115.6	2.4	64.3	18 90	
		1/2	3 1/16 x 4 1/16 x 3 1/16	8 5/8	1 7/8	6 7/8		250.8	3.4	138.6	2.5	73.9	21.74	
		9/16	3 1/8 x 4 1/8 x 3 1/8	8 15/16	1 15/16	6 15/16		280.4	3.3	163.0	2.5	83.6	24.58	
		5/8	3 1/16 x 4 x 3 1/16	8 5/8	2	6 1/2		296.3	3.3	167.3	2.5	90.1	26.58	
		11/16	3 1/8 x 4 1/16 x 3 1/8	8 13/16	2 1/16	6 5/16		323.8	3.3	192.8	2.5	99.9	29.37	
		3/4	3 3/16 x 4 1/8 x 3 3/16	9	2 1/8	6 1/8		351.5	3.3	220.5	2.6	109.7	32.25	
10	7" Web — SAME THICKNESS AS Z-BAR	5/16	3 3/16 x 5 x 3 3/16	10 5/16	1 11/16	9 1/16		193.8	3.5	147.4	3.0	53.1	15.63	
		3/8	3 1/4 x 5 1/16 x 3 1/4	10 1/2	1 3/4	9 1/8		231.0	3.5	183.4	3.1	64.0	18.83	
		7/16	3 3/16 x 5 1/8 x 3 3/16	10 11/16	1 15/16	9 3/16		267.6	3.4	222.0	3.1	75.0	22.06	
		1/2	3 1/4 x 5 x 3 1/4	10 1/2	1 7/8	8 3/4		287.6	3.4	234.4	3.1	83.0	24.42	
		9/16	3 5/16 x 5 1/16 x 3 5/16	10 11/16	1 15/16	8 13/16		321.1	3.4	273.7	3.1	93.7	27.58	
		5/8	3 3/8 x 5 1/8 x 3 3/8	10 7/8	2	8 7/8		354.3	3.3	315.6	3.2	104.7	30.78	
		11/16	3 1/4 x 5 x 3 1/4	10 11/16	2 1/16	8 7/16		364.8	3.3	320.0	3.1	111.0	32.65	
		3/4	3 5/16 x 5 1/16 x 3 5/16	10 7/8	2 1/8	8 1/2		395.5	3.3	363.0	3.1	121.7	35.81	
12	8" Web — SAME THICKNESS AS Z-BAR	9/16	3 1/2 x 6 x 3 1/2	12 3/8	1 3/4	11		337.0	3.9	287.8	3.6	72.6	21.36	
		7/16	3 9/16 x 6 1/16 x 3 9/16	12 9/16	1 13/16	11 1/16		391.4	3.9	346.9	3.7	85.2	25.06	
		1/2	3 5/8 x 6 1/8 x 3 5/8	12 3/4	1 7/8	11 1/8		444.6	3.9	409.2	3.7	97.7	28.76	
		9/16	3 1/2 x 6 x 3 1/2	12 9/16	1 15/16	10 11/16		469.1	3.8	426.3	3.6	106.1	31.22	
		5/8	3 9/16 x 6 1/16 x 3 9/16	12 3/4	2	10 3/4		518.0	3.8	489.2	3.7	118.4	34.84	
		11/16	3 5/8 x 6 1/8 x 3 5/8	12 15/16	2 1/16	10 15/16		566.5	3.8	555.8	3.8	130.9	38.50	
		3/4	3 1/2 x 6 x 3 1/2	12 3/4	2 1/8	10 3/8		579.7	3.7	562.4	3.7	137.9	40.56	
		13/16	3 9/16 x 6 1/16 x 3 9/16	12 15/16	2 3/16	10 7/16		622.5	3.7	628.2	3.7	149.6	44.02	
		7/8	3 5/8 x 6 1/8 x 3 5/8	13 1/8	2 1/4	10 1/2		666.6	3.7	699.1	3.8	162.0	47.64	

RIVETS $\frac{3}{4}$" DIAM.

SHEARING AND BEARING VALUE OF RIVETS.

Values above or to right of upper zigzag lines are greater than double shear.
" below " " left " lower " " " less " single "

DIAM. OF RIVET		AREA IN SQ. INS.	SINGLE SHEAR AT # 6000	BEARING VALUE FOR DIFFERENT THICKNESS OF PLATE AT 12000, # PER SQ. INCH.												
FRAC.	DEC'L			1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
3/8	.375	.1104	660	1130	1410	1690										
1/2	.500	.1963	1180	1500	1880	2250	2630	3000								
5/8	.625	.3068	1840	1880	2340	2810	3280	3750	4220	4690						
3/4	.750	.4418	2650	2250	2810	3380	3940	4500	5160	5630	6190	6750				
7/8	.875	.6013	3610	2630	3280	3940	4590	5250	5910	6560	7220	7880	8530	9190	9840	
1	1.000	.7854	4710	3000	3750	4500	5250	6000	6750	7500	8250	9000	9750	10500	11250	12000

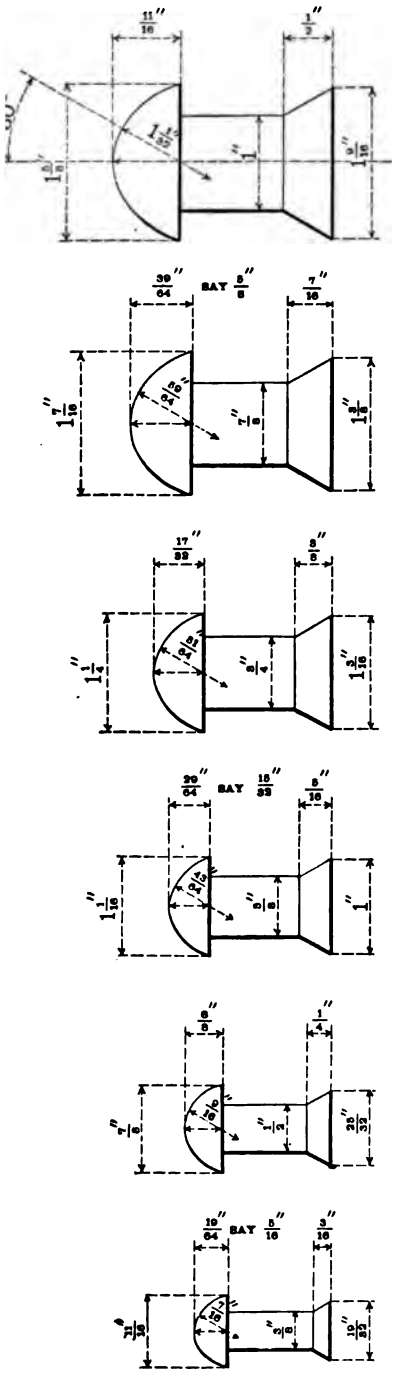
DIAM. OF RIVET		AREA IN SQ. INS.	SINGLE SHEAR AT # 7500	BEARING VALUE FOR DIFFERENT THICKNESS OF PLATE AT 15000, # PER SQ. INCH.												
FRAC.	DEC'L			1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
3/8	.375	.1104	830	1410	1760	2110										
1/2	.500	.1963	1470	1880	2340	2810	3280	3750								
5/8	.625	.3068	2300	2340	2930	3520	4100	4690	5280	5860						
3/4	.750	.4418	3310	2810	3520	4220	4920	5630	6330	7030	7720	8440				
7/8	.875	.6013	4510	3280	4100	4920	5740	6560	7380	8200	9030	9850	10670	11480	12300	
1	1.000	.7854	5890	3750	4690	5620	6560	7500	8440	9380	10310	11250	12190	13130	14060	15000

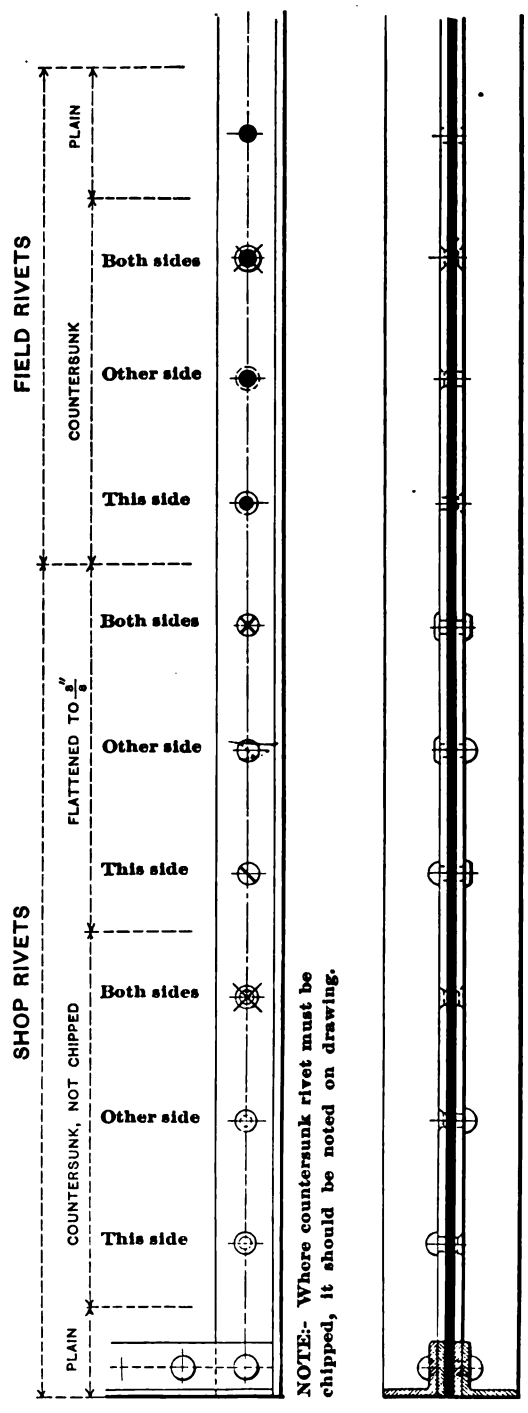
DIAM. OF RIVET		AREA IN SQ. INS.	SINGLE SHEAR AT # 11000	BEARING VALUE FOR DIFFERENT THICKNESS OF PLATE AT 22000, # PER SQ. INCH.												
FRAC.	DEC'L			1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
3/8	.375	.1104	1210	2060	2580	3090										
1/2	.500	.1963	2160	2750	3440	4130	4820	5500								
5/8	.625	.3068	3370	3440	4300	5160	6020	6880	7740	8600						
3/4	.750	.4418	4860	4130	5160	6190	7220	8250	9280	10320	11340	12380				
7/8	.875	.6013	6610	4810	6020	7220	8430	9630	10840	12040	13240	14440	15640	16840	18050	
1	1.000	.7854	8640	5500	6880	8250	9630	11000	12380	13750	15130	16500	17880	19250	20630	22000

DIAM. OF RIVET		AREA IN SQ. INS.	SINGLE SHEAR AT # 12000	BEARING VALUE FOR DIFFERENT THICKNESS OF PLATE AT 24000, # PER SQ. INCH.												
FRAC.	DEC'L			1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1
3/8	.375	.1104	1320	2250	2810	3380										
1/2	.500	.1963	2360	3000	3750	4500	5250	6000								
5/8	.625	.3068	3680	3750	4690	5620	6560	7500	8440	9370						
3/4	.750	.4418	5300	4500	5620	6750	7870	9000	10120	11250	12370	13500				
7/8	.875	.6013	7220	5250	6560	7870	9190	10500	11810	13120	14440	15750	17060	18370		
1	1.000	.7854	9430	6000	7500	9000	10500	12000	13500	15000	16500	18000	19500	21000	22500	24000

RIVETS.

Proportions and Conventional Signs.



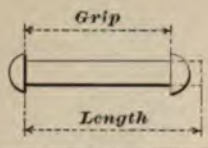


NOTE:- Where countersunk rivet must be chipped, it should be noted on drawing.

RIVETS

Lengths of fieldrivets for variant grips.

Dimensions in Inches



GRIP	DIAMETER					GRIP
	1/2	5/8	3/4	7/8	1	
1/2	1 5/8	1 7/8	2	2 1/8	2 1/4	1/2
5/8	1 3/4	2	2 1/8	2 1/4	2 3/8	5/8
3/4	1 7/8	2 1/8	2 1/4	2 3/8	2 1/2	3/4
7/8	2	2 1/4	2 3/8	2 1/2	2 5/8	7/8
1	2 1/8	2 3/8	2 1/2	2 5/8	2 3/4	1
1 1/8	2 1/4	2 1/2	2 5/8	2 3/4	2 7/8	1 1/8
1 1/4	2 3/8	2 5/8	2 3/4	2 7/8	3	1 1/4
1 3/8	2 1/2	2 3/4	2 7/8	3	3 1/8	1 3/8
1 1/2	2 3/4	3	3 1/8	3 1/4	3 3/8	1 1/2
1 5/8	2 7/8	3 1/8	3 1/4	3 3/8	3 1/2	1 5/8
1 3/4	3	3 1/4	3 3/8	3 1/2	3 5/8	1 3/4
1 7/8	3 1/8	3 3/8	3 1/2	3 5/8	3 3/4	1 7/8
2	3 1/4	3 1/2	3 5/8	3 3/4	3 7/8	2
2 1/8	3 3/8	3 5/8	3 3/4	3 7/8	4	2 1/8
2 1/4	3 1/2	3 3/4	3 7/8	4	4 1/8	2 1/4
2 3/8	3 5/8	3 7/8	4	4 1/8	4 1/4	2 3/8
2 1/2	3 3/4	4	4 1/8	4 1/4	4 3/8	2 1/2
2 5/8	3 7/8	4 1/8	4 1/4	4 3/8	4 1/2	2 5/8
2 3/4	4	4 1/4	4 3/8	4 1/2	4 5/8	2 3/4
2 7/8	4 1/8	4 3/8	4 1/2	4 5/8	4 3/4	2 7/8
3	4 3/8	4 5/8	4 3/4	4 7/8	5	3
3 1/8	4 1/2	4 3/4	4 7/8	5	5 1/8	3 1/8
3 1/4	4 5/8	4 7/8	5	5 1/8	5 1/4	3 1/4
3 3/8	4 3/4	5	5 1/8	5 1/4	5 3/8	3 3/8
3 1/2	4 7/8	5 1/8	5 1/4	5 3/8	5 1/2	3 1/2
3 5/8	5	5 1/4	5 3/8	5 1/2	5 5/8	3 5/8
3 3/4	5 1/8	5 3/8	5 1/2	5 5/8	5 3/4	3 3/4
3 7/8	5 1/4	5 1/2	5 5/8	5 3/4	5 7/8	3 7/8
4	5 3/8	5 5/8	5 3/4	5 7/8	6	4
4 1/8	5 1/2	5 3/4	5 7/8	6	6 1/8	4 1/8
4 1/4	5 5/8	5 7/8	6	6 1/8	6 1/4	4 1/4
4 3/8	5 3/4	6	6 1/8	6 1/4	6 3/8	4 3/8
4 1/2	6	6 1/4	6 3/8	6 1/2	6 5/8	4 1/2
4 5/8	6 1/8	6 3/8	6 1/2	6 5/8	6 3/4	4 5/8
4 3/4	6 1/4	6 1/2	6 5/8	6 3/4	6 7/8	4 3/4
4 7/8	6 3/8	6 5/8	6 3/4	6 7/8	7	4 7/8
5	6 1/2	6 3/4	7	7 1/8	7 1/4	5
5 1/8	6 5/8	6 7/8	7	7 1/8	7 1/4	5 1/8
5 1/4	6 3/4	7	7 1/8	7 1/4	7 3/8	5 1/4
5 3/8	6 7/8	7 1/8	7 1/4	7 3/8	7 1/2	5 3/8

GRIP	DIAMETER					GRIP
	1/2	5/8	3/4	7/8	1	
1/2	1 1/4	1 3/8	1 3/8	1 1/2	1 1/2	1/2
5/8	1 3/8	1 1/2	1 1/2	1 5/8	1 5/8	5/8
3/4	1 1/2	1 5/8	1 5/8	1 3/4	1 3/4	3/4
7/8	1 5/8	1 3/4	1 3/4	1 7/8	1 7/8	7/8
1	1 3/4	1 7/8	1 7/8	2	2	1
1 1/8	1 7/8	2	2	2 1/8	2 1/8	1 1/8
1 1/4	2	2 1/8	2 1/8	2 1/4	2 1/4	1 1/4
1 3/8	2 1/8	2 1/4	2 1/4	2 3/8	2 3/8	1 3/8
1 1/2	2 1/4	2 3/8	2 1/2	2 1/2	2 5/8	1 1/2
1 5/8	2 3/8	2 1/2	2 5/8	2 5/8	2 3/4	1 5/8
1 3/4	2 1/2	2 5/8	2 3/4	2 3/4	2 7/8	1 3/4
1 7/8	2 5/8	2 3/4	2 7/8	2 7/8	3	1 7/8
2	2 3/4	2 7/8	3	3	3 1/8	2
2 1/8	2 7/8	3	3 1/8	3 1/8	3 1/4	2 1/8
2 1/4	3	3 1/8	3 1/4	3 3/8	3 3/8	2 1/4
2 3/8	3 1/8	3 1/4	3 3/8	3 3/8	3 1/2	2 3/8
2 1/2	3 1/4	3 3/8	3 1/2	3 1/2	3 5/8	2 1/2
2 5/8	3 3/8	3 1/2	3 5/8	3 5/8	3 3/4	2 5/8
2 3/4	3 1/2	3 5/8	3 3/4	3 3/4	3 7/8	2 3/4
2 7/8	3 5/8	3 3/4	3 7/8	3 7/8	4	2 7/8
3	3 7/8	3 7/8	4	4 1/8	4 1/4	3
3 1/8	4	4	4 1/8	4 1/4	4 3/8	3 1/8
3 1/4	4 1/8	4 1/4	4 1/4	4 3/8	4 1/2	3 1/4
3 3/8	4 1/4	4 3/8	4 3/8	4 1/2	4 5/8	3 3/8
3 1/2	4 3/8	4 1/2	4 1/2	4 5/8	4 3/4	3 1/2
3 5/8	4 1/2	4 5/8	4 5/8	4 3/4	4 7/8	3 5/8
3 3/4	4 5/8	4 3/4	4 3/4	4 7/8	5	3 3/4
3 7/8	4 3/4	4 7/8	4 7/8	5	5 1/8	3 7/8
4	4 7/8	5	5 1/8	5 1/8	5 1/4	4
4 1/8	5	5 1/8	5 1/4	5 1/4	5 3/8	4 1/8
4 1/4	5 1/8	5 1/4	5 3/8	5 3/8	5 1/2	4 1/4
4 3/8	5 1/4	5 3/8	5 1/2	5 1/2	5 5/8	4 3/8
4 1/2				5 5/8	5 3/4	4 1/2
4 5/8				5 3/4	5 7/8	4 5/8
4 3/4				5 7/8	6	4 3/4
4 7/8				6	6 1/8	4 7/8
5				6 1/8	6 1/4	5
5 1/8				6 1/4	6 3/8	5 1/8
5 1/4				6 3/8	6 1/2	5 1/4
5 3/8				6 1/2	6 5/8	5 3/8

BOLTS

Lengths for variant grips

ALL DIMENSIONS IN INCHES

GRIP	DIAMETER					GRIP	GRIP	DIAMETER					GRIP
	1/2	5/8	3/4	7/8	1			1/2	5/8	3/4	7/8	1	
1/2	1 1/4	1 1/4	1 1/2	1 1/2	1 3/4	1/2	5 1/2	6 1/4	6 1/4	6 1/2	6 1/2	6 3/4	5 1/2
5/8	1 1/4	1 1/2	1 1/2	1 3/4	1 3/4	5/8	5 5/8	6 1/4	6 1/2	6 1/2	6 3/4	6 3/4	5 5/8
3/4	1 1/2	1 1/2	1 3/4	1 3/4	2	3/4	5 3/4	6 1/2	6 1/2	6 3/4	6 3/4	7	5 3/4
7/8	1 1/2	1 3/4	1 3/4	2	2	7/8	5 7/8	6 1/2	6 3/4	6 3/4	7	7	5 7/8
1	1 3/4	1 3/4	2	2	2 1/4	1	6	6 3/4	6 3/4	7	7	7 1/4	6
1 1/8	1 3/4	2	2	2 1/4	2 1/4	1 1/8	6 1/8	6 3/4	7	7	7 1/4	7 1/4	6 1/8
1 1/4	2	2	2 1/4	2 1/4	2 1/2	1 1/4	6 1/4	7	7	7 1/4	7 1/2	7 1/2	6 1/4
1 3/8	2	2 1/4	2 1/4	2 1/2	2 1/2	1 3/8	6 3/8	7	7 1/4	7 1/4	7 1/2	7 1/2	6 3/8
1 1/2	2 1/4	2 1/4	2 1/2	2 1/2	2 3/4	1 1/2	6 1/2	7 1/4	7 1/4	7 1/2	7 1/2	7 3/4	6 1/2
1 5/8	2 1/4	2 1/2	2 1/2	2 3/4	2 3/4	1 5/8	6 5/8	7 1/4	7 1/2	7 1/2	7 3/4	7 3/4	6 5/8
1 3/4	2 1/2	2 1/2	2 3/4	2 3/4	3	1 3/4	6 3/4	7 1/2	7 1/2	7 3/4	7 3/4	8	6 3/4
1 7/8	2 1/2	2 3/4	2 3/4	3	3	1 7/8	6 7/8	7 1/2	7 3/4	7 3/4	8	8	6 7/8
2	2 3/4	2 3/4	3	3	3 1/4	2	7	7 3/4	7 3/4	8	8	8 1/4	7
2 1/8	2 3/4	3	3	3 1/4	3 1/4	2 1/8	7 1/8	7 3/4	8	8	8 1/4	8 1/4	7 1/8
2 1/4	3	3	3 1/4	3 1/4	3 1/2	2 1/4	7 1/4	8	8	8 1/4	8 1/4	8 1/2	7 1/4
2 3/8	3	3 1/4	3 1/4	3 1/2	3 1/2	2 3/8	7 3/8	8	8 1/4	8 1/4	8 1/2	8 1/2	7 3/8
2 1/2	3 1/4	3 1/4	3 1/2	3 1/2	3 3/4	2 1/2	7 1/2	8 1/4	8 1/4	8 1/2	8 1/2	8 3/4	7 1/2
2 5/8	3 1/4	3 1/2	3 1/2	3 3/4	3 3/4	2 5/8	7 5/8	8 1/4	8 1/2	8 1/2	8 3/4	8 3/4	7 5/8
2 3/4	3 1/2	3 1/2	3 3/4	3 3/4	4	2 3/4	7 3/4	8 1/2	8 1/2	8 3/4	8 3/4	9	7 3/4
2 7/8	3 1/2	3 3/4	3 3/4	4	4	2 7/8	7 7/8	8 1/2	8 3/4	8 3/4	9	9	7 7/8
3	3 3/4	3 3/4	4	4	4 1/4	3	8	8 3/4	8 3/4	9	9	9 1/4	8
3 1/8	3 3/4	4	4	4 1/4	4 1/4	3 1/8	8 1/8	8 3/4	9	9	9 1/4	9 1/4	8 1/8
3 1/4	4	4	4 1/4	4 1/4	4 1/2	3 1/4	8 1/4	9	9	9 1/4	9 1/4	9 1/2	8 1/4
3 3/8	4	4 1/4	4 1/4	4 1/2	4 1/2	3 3/8	8 3/8	9	9 1/4	9 1/4	9 1/2	9 1/2	8 3/8
3 1/2	4 1/4	4 1/4	4 1/2	4 1/2	4 3/4	3 1/2	8 1/2	9 1/4	9 1/4	9 1/2	9 1/2	9 3/4	8 1/2
3 5/8	4 1/4	4 1/2	4 1/2	4 3/4	4 3/4	3 5/8	8 5/8	9 1/4	9 1/2	9 1/2	9 3/4	9 3/4	8 5/8
3 3/4	4 1/2	4 1/2	4 3/4	4 3/4	5	3 3/4	8 3/4	9 1/2	9 1/2	9 3/4	9 3/4	10	8 3/4
3 7/8	4 1/2	4 3/4	4 3/4	5	5	3 7/8	8 7/8	9 1/2	9 3/4	9 3/4	10	10	8 7/8
4	4 3/4	4 3/4	5	5	5 1/4	4	9	9 3/4	9 3/4	10	10	10 1/4	9
4 1/8	4 3/4	5	5	5 1/4	5 1/4	4 1/8	9 1/8	9 3/4	10	10	10 1/4	10 1/2	9 1/8
4 1/4	5	5	5 1/4	5 1/2	5 1/2	4 1/4	9 1/4	10	10	10 1/2	10 1/4	10 1/2	9 1/4
4 3/8	5	5 1/4	5 1/4	5 1/2	5 1/2	4 3/8	9 3/8	10	10 1/4	10 1/4	10 1/2	10 1/2	9 3/8
4 1/2	5 1/4	5 1/4	5 1/2	5 1/2	5 3/4	4 1/2	9 1/2	10 1/4	10 1/4	10 1/2	10 1/2	10 3/4	9 1/2
4 5/8	5 1/4	5 1/2	5 1/2	5 3/4	5 3/4	4 5/8	9 5/8	10 1/4	10 1/2	10 1/2	10 3/4	10 3/4	9 5/8
4 3/4	5 1/2	5 1/2	5 3/4	5 3/4	6	4 3/4	9 3/4	10 1/2	10 1/2	10 3/4	10 3/4	11	9 3/4
4 7/8	5 1/2	5 3/4	5 3/4	6	6	4 7/8	9 7/8	10 1/2	10 3/4	10 3/4	11	11	9 7/8
5	5 3/4	5 3/4	6	6	6 1/4	5	10	10 3/4	10 3/4	11	11	11 1/4	10
5 1/8	5 3/4	6	6	6 1/4	6 1/4	5 1/8	10 1/8	10 3/4	11	11	11 1/4	11 1/4	10 1/8
5 1/4	6	6	6 1/4	6 1/4	6 1/2	5 1/4	10 1/4	11	11	11 1/4	11 1/2	11 1/2	10 1/4
5 3/8	6	6 1/4	6 1/4	6 1/2	6 1/2	5 3/8	10 3/8	11	11 1/4	11 1/4	11 1/2	11 1/2	10 3/8

ANGLES

Weight in pounds per foot.

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE
8 x 8							26.4	29.8	33.2	36.6	39.0	42.4	45.8	49.3	52.8	8 x 8
6 x 6					14.8	17.3	19.7	22.0	24.4	26.5	28.8	31.0	33.4	35.9		6 x 6
5 x 5					12.3	14.3	16.3	18.2	20.1	22.0	23.8	25.6	27.4	29.4		5 x 5
4 x 4				8.2	9.8	11.3	12.8	14.5	15.8	17.2	18.6					4 x 4
3½ x 3½				7.1	8.5	9.8	11.1	12.4	13.7							3½ x 3½
3 x 3			4.9	6.1	7.2	8.3	9.4	10.4	11.5							3 x 3
2¾ x 2¾			4.5	5.5	6.6	7.7	8.6									2¾ x 2¾
2½ x 2½		3.1	4.1	5.0	5.9	6.9	7.8									2½ x 2½
2¼ x 2¼		2.7	3.6	4.5	5.4											2¼ x 2¼
2 x 2		2.5	3.2	4.0	4.8											2 x 2
1¾ x 1¾		2.1	2.8	3.5	4.1											1¾ x 1¾
1½ x 1½	1.2	1.8	2.4	2.9	3.5											1½ x 1½
1¼ x 1¼	1.0	1.5	2.0													1¼ x 1¼
1 x 1	0.8	1.2	1.5													1 x 1

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE
8 x 6							23.0	25.8	28.8	31.7	34.6	37.5	40.4	43.4	46.4	8 x 6
7 x 3½							17.0	19.0	21.0	23.0	24.8	26.7	28.6	30.5	32.5	7 x 3½
6 x 4					12.2	14.3	16.3	18.1	20.1	22.0	23.8	25.6	27.4	29.4		6 x 4
6 x 3½					11.6	13.6	15.5	17.1	19.0	20.8	22.6	24.5	26.5	28.6		6 x 3½
5 x 4					11.0	12.8	14.6	16.2	17.9	19.6	21.3					5 x 4
5 x 3½				8.7	10.3	12.0	13.6	15.2	16.8	18.4	20.0					5 x 3½
5 x 3				8.2	9.7	11.2	12.8	14.2	15.7	17.2	18.7					5 x 3
4 x 3½				7.7	9.1	10.5	11.9	13.3	14.7	16.0	17.4					4 x 3½
4 x 3				7.1	8.5	9.8	11.1	12.4	13.8							4 x 3
3½ x 3				6.6	7.8	9.1	10.3	11.6	12.9							3½ x 3
3½ x 2½			4.9	6.1	7.2	8.3	9.4									3½ x 2½
3 x 2½			4.5	5.5	6.6	7.7	8.7									3 x 2½
2½ x 2		2.7	3.6	4.5	5.4	6.2	7.0									2½ x 2
2 x 1½		2.1	2.9	3.6	4.3											2 x 1½
2 x 1¼		1.9	2.6	3.3	3.9											2 x 1¼

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE

Note: ⌈ **Indicates finishing rolls**

BOLTS.

Dimensions for Heads, Nuts, etc., etc.

DIAMETER	ROUND				HEAD					NUT					DIAMETER
					HEXAGONAL		HEX. OR SQUARE	SQUARE		SQUARE		HEX. OR SQUARE	HEXAGONAL		
	AREA	DIAM. AT ROOT OF THREAD	AREA AT ROOT OF THREAD	NO. OF THREADS PER INCH	LONG DIAM.	SHORT DIAM.	HEIGHT	SHORT DIAM.	LONG DIAM.	LONG DIAM.	SHORT DIAM.	HEIGHT	SHORT DIAM.	LONG DIAM.	
INS.	SQ. INS.	INS.	SQ. INS.		INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.	INS.
$\frac{1}{4}$	.049	.185	.027	20	$\frac{7}{16}$	$\frac{3}{8}$		$\frac{3}{8}$	$\frac{1}{2}$	$\frac{23}{32}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{19}{32}$	$\frac{1}{4}$
$\frac{3}{8}$	.110	.294	.068	16	$\frac{21}{32}$	$\frac{9}{16}$		$\frac{17}{32}$	$\frac{3}{4}$	1	$\frac{11}{16}$	$\frac{3}{8}$	$\frac{11}{16}$	$\frac{13}{16}$	$\frac{3}{8}$
$\frac{1}{2}$	.196	.400	.126	13	$\frac{7}{8}$	$\frac{3}{4}$		$\frac{23}{32}$	1	$1\frac{1}{4}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{7}{8}$	1	$\frac{1}{2}$
$\frac{5}{8}$	.307	.507	.202	11	$1\frac{3}{32}$	$\frac{15}{16}$		$\frac{29}{32}$	$1\frac{9}{32}$	$1\frac{1}{2}$	$1\frac{1}{16}$	$\frac{5}{8}$	$1\frac{1}{16}$	$1\frac{7}{32}$	$\frac{5}{8}$
$\frac{3}{4}$	.442	.620	.302	10	$1\frac{5}{16}$	$1\frac{1}{8}$	$\frac{5}{8}$	$1\frac{3}{32}$	$1\frac{17}{32}$	$1\frac{25}{32}$	$1\frac{1}{4}$	$\frac{3}{4}$	$1\frac{1}{4}$	$1\frac{3}{4}$	$\frac{3}{4}$
$\frac{7}{8}$	.601	.731	.420	9	$1\frac{17}{32}$	$1\frac{5}{16}$	$\frac{3}{4}$	$1\frac{9}{32}$	$1\frac{13}{16}$	$2\frac{1}{32}$	$1\frac{7}{16}$	$\frac{7}{8}$	$1\frac{7}{16}$	$1\frac{21}{32}$	$\frac{7}{8}$
1	.785	.837	.550	8	$1\frac{3}{32}$	$1\frac{1}{2}$	$\frac{7}{8}$	$1\frac{15}{32}$	$2\frac{1}{16}$	$2\frac{5}{16}$	$1\frac{5}{8}$	1	$1\frac{5}{8}$	$1\frac{7}{8}$	1
$1\frac{1}{8}$	.994	.940	.694	7	$1\frac{31}{32}$	$1\frac{11}{16}$	1	$1\frac{5}{8}$	$2\frac{5}{16}$	$2\frac{9}{16}$	$1\frac{13}{16}$	$1\frac{1}{8}$	$1\frac{13}{16}$	$2\frac{3}{32}$	$1\frac{1}{8}$
$1\frac{1}{4}$	1.227	1.065	.893	"	$2\frac{3}{16}$	$1\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{13}{16}$	$2\frac{9}{16}$	$2\frac{27}{32}$	2	$1\frac{1}{4}$	2	$2\frac{5}{16}$	$1\frac{1}{4}$
$1\frac{3}{8}$	1.485	1.160	1.057	6	$2\frac{5}{16}$	2	$1\frac{1}{4}$	2	$2\frac{13}{16}$	$3\frac{3}{32}$	$2\frac{3}{16}$	$1\frac{3}{8}$	$2\frac{3}{16}$	$2\frac{17}{32}$	$1\frac{3}{8}$
$1\frac{1}{2}$	1.767	1.284	1.295	"	$2\frac{5}{8}$	$2\frac{1}{4}$	$1\frac{3}{8}$	$2\frac{3}{16}$	$3\frac{1}{16}$	$3\frac{3}{8}$	$2\frac{3}{8}$	$1\frac{1}{2}$	$2\frac{3}{8}$	$2\frac{3}{4}$	$1\frac{1}{2}$
$1\frac{5}{8}$	2.074	1.389	1.515	$5\frac{1}{2}$	$2\frac{13}{16}$	$2\frac{7}{16}$	$1\frac{1}{2}$	$2\frac{3}{8}$	$3\frac{11}{32}$	$3\frac{5}{8}$	$2\frac{9}{16}$	$1\frac{5}{8}$	$2\frac{9}{16}$	$2\frac{31}{32}$	$1\frac{5}{8}$
$1\frac{3}{4}$	2.405	1.491	1.746	5	$3\frac{1}{32}$	$2\frac{5}{8}$	$1\frac{5}{8}$	$2\frac{17}{32}$	$3\frac{19}{32}$	$3\frac{29}{32}$	$2\frac{3}{4}$	$1\frac{3}{4}$	$2\frac{3}{4}$	$3\frac{3}{16}$	$1\frac{3}{4}$
$1\frac{7}{8}$	2.761	1.616	2.051	"	$3\frac{1}{4}$	$2\frac{13}{16}$	$1\frac{3}{4}$	$2\frac{23}{32}$	$3\frac{27}{32}$	$4\frac{5}{32}$	$2\frac{15}{16}$	$1\frac{7}{8}$	$2\frac{15}{16}$	$3\frac{13}{32}$	$1\frac{7}{8}$
2	3.142	1.712	2.302	$4\frac{1}{2}$	$3\frac{15}{32}$	3	$1\frac{7}{8}$	$2\frac{29}{32}$	$4\frac{1}{8}$	$4\frac{7}{16}$	$3\frac{1}{8}$	2	$3\frac{1}{8}$	$3\frac{5}{8}$	2
$2\frac{1}{4}$	3.976	1.962	3.023	"	$3\frac{29}{32}$	$3\frac{3}{8}$	$2\frac{1}{8}$	$3\frac{1}{4}$	$4\frac{5}{8}$	$4\frac{31}{32}$	$3\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{1}{2}$	$4\frac{1}{16}$	$2\frac{1}{4}$
$2\frac{1}{2}$	4.909	2.176	3.719	4	$4\frac{11}{32}$	$3\frac{3}{4}$	$2\frac{3}{8}$	$3\frac{5}{8}$	$5\frac{1}{8}$	$5\frac{1}{2}$	$3\frac{7}{8}$	$2\frac{1}{2}$	$3\frac{7}{8}$	$4\frac{1}{2}$	$2\frac{1}{2}$
$2\frac{3}{4}$	5.940	2.426	4.620	"	$4\frac{25}{32}$	$4\frac{1}{8}$	$2\frac{5}{8}$	4	$5\frac{21}{32}$	6	$4\frac{1}{4}$	$2\frac{3}{4}$	$4\frac{1}{4}$	$4\frac{29}{32}$	$2\frac{3}{4}$
3	7.069	2.629	5.428	$3\frac{1}{2}$	$5\frac{7}{32}$	$4\frac{1}{2}$	$2\frac{7}{8}$	$4\frac{11}{32}$	$6\frac{5}{32}$	$6\frac{9}{16}$	$4\frac{5}{8}$	3	$4\frac{5}{8}$	$5\frac{3}{8}$	3
$3\frac{1}{4}$	8.296	2.879	6.510	"	$5\frac{5}{8}$	$4\frac{7}{8}$	$3\frac{1}{8}$	$4\frac{23}{32}$	$6\frac{21}{32}$	$7\frac{1}{16}$	5	$3\frac{1}{4}$	5	$5\frac{13}{16}$	$3\frac{1}{4}$
$3\frac{1}{2}$	9.621	3.100	7.548	$3\frac{1}{4}$	$6\frac{1}{16}$	$5\frac{1}{4}$	$3\frac{3}{8}$	$5\frac{1}{16}$	$7\frac{3}{16}$	$7\frac{5}{8}$	$5\frac{3}{8}$	$3\frac{1}{2}$	$5\frac{3}{8}$	$6\frac{1}{8}$	$3\frac{1}{2}$
$3\frac{3}{4}$	11.045	3.317	8.641	3	$6\frac{1}{2}$	$5\frac{5}{8}$	$3\frac{5}{8}$	$5\frac{7}{16}$	$7\frac{11}{16}$	$8\frac{1}{8}$	$5\frac{3}{4}$	$3\frac{3}{4}$	$5\frac{3}{4}$	$6\frac{21}{32}$	$3\frac{3}{4}$
4	12.566	3.567	9.963	"	$6\frac{15}{16}$	6	$3\frac{7}{8}$	$5\frac{13}{16}$	$8\frac{7}{32}$	$8\frac{21}{32}$	$6\frac{1}{8}$	4	$6\frac{1}{8}$	$7\frac{3}{32}$	4
$4\frac{1}{4}$	14.186	3.798	11.329	$2\frac{7}{8}$	$7\frac{11}{32}$	$6\frac{3}{8}$	$4\frac{1}{8}$	$6\frac{5}{32}$	$8\frac{23}{32}$	$9\frac{3}{16}$	$6\frac{1}{2}$	$4\frac{1}{4}$	$6\frac{1}{2}$	$7\frac{9}{16}$	$4\frac{1}{4}$
$4\frac{1}{2}$	15.904	4.028	12.753	$2\frac{3}{4}$	$7\frac{25}{32}$	$6\frac{3}{4}$	$4\frac{3}{8}$	$6\frac{17}{32}$	$9\frac{7}{32}$	$9\frac{3}{4}$	$6\frac{7}{8}$	$4\frac{1}{2}$	$6\frac{7}{8}$	$7\frac{31}{32}$	$4\frac{1}{2}$
$4\frac{3}{4}$	17.721	4.256	14.226	$2\frac{5}{8}$	$8\frac{7}{32}$	$7\frac{1}{8}$	$4\frac{5}{8}$	$6\frac{7}{8}$	$9\frac{3}{4}$	$10\frac{1}{4}$	$7\frac{1}{4}$	$4\frac{3}{4}$	$7\frac{1}{4}$	$8\frac{13}{32}$	$4\frac{3}{4}$
5	19.635	4.480	15.763	$2\frac{1}{2}$	$8\frac{21}{32}$	$7\frac{1}{2}$	$4\frac{7}{8}$	$7\frac{1}{4}$	$10\frac{1}{4}$	$10\frac{20}{32}$	$7\frac{5}{8}$	5	$7\frac{5}{8}$	$8\frac{27}{32}$	5
$5\frac{1}{4}$	21.648	4.730	17.572	"	$9\frac{3}{32}$	$7\frac{7}{8}$	$5\frac{1}{8}$	$7\frac{5}{8}$	$10\frac{3}{4}$	$11\frac{3}{8}$	8	$5\frac{1}{4}$	8	$9\frac{9}{32}$	$5\frac{1}{4}$
$5\frac{1}{2}$	23.758	4.953	19.267	$2\frac{3}{8}$	$9\frac{1}{2}$	$8\frac{1}{4}$	$5\frac{3}{8}$	$7\frac{31}{32}$	$11\frac{9}{32}$	$11\frac{7}{8}$	$8\frac{3}{8}$	$5\frac{1}{2}$	$8\frac{3}{8}$	$9\frac{23}{32}$	$5\frac{1}{2}$
$5\frac{3}{4}$	25.967	5.203	21.262	"	$9\frac{15}{16}$	$8\frac{5}{8}$	$5\frac{5}{8}$	$8\frac{11}{32}$	$11\frac{25}{32}$	$12\frac{3}{8}$	$8\frac{3}{4}$	$5\frac{3}{4}$	$8\frac{3}{4}$	$10\frac{5}{32}$	$5\frac{3}{4}$
6	28.274	5.423	23.098	$2\frac{1}{4}$	$10\frac{3}{8}$	9	$5\frac{7}{8}$	$8\frac{23}{32}$	$12\frac{5}{16}$	$12\frac{15}{16}$	$9\frac{1}{8}$	6	$9\frac{1}{8}$	$10\frac{19}{32}$	6

ANGLES

Area in square inches.

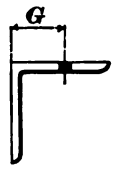
SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE
8 ×8							7.76	8.76	9.76	10.76	11.47	12.47	13.47	14.50	15.53	8 ×8
6 ×6					4.35	5.09	5.79	6.47	7.18	7.79	8.47	9.12	9.82	10.56		6 ×6
5 ×5					3.62	4.21	4.79	5.35	5.91	6.47	7.00	7.53	8.06	8.65		5 ×5
4 ×4				2.41	2.88	3.32	3.76	4.21	4.65	5.06	5.47					4 ×4
3½×3½				2.09	2.50	2.88	3.26	3.65	4.03							3½×3½
3 ×3			1.44	1.79	2.12	2.44	2.76	3.06	3.38							3 ×3
2¾×2¾			1.32	1.65	1.94	2.26	2.53									2¾×2¾
2½×2½		0.91	1.21	1.47	1.74	2.03	2.29									2½×2½
2¼×2¼		0.79	1.06	1.32	1.59											2¼×2¼
2 ×2		0.74	0.94	1.18	1.41											2 ×2
1¾×1¾		0.62	0.82	1.03	1.21											1¾×1¾
1½×1½	0.35	0.53	0.71	0.85	1.03											1½×1½
1¼×1¼	0.29	0.44	0.59													1¼×1¼
1 ×1	0.24	0.35	0.44													1 ×1

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE
8 ×6							6.76	7.59	8.44	9.32	9.94	10.76	11.62	12.50	13.41	8 ×6
7 ×3½							5.00	5.59	6.18	6.76	7.29	7.85	8.41	8.97	9.56	7 ×3½
6 ×4					3.59	4.21	4.79	5.32	5.91	6.47	7.00	7.53	8.06	8.65		6 ×4
6 ×3½					3.41	4.00	4.56	5.03	5.59	6.12	6.65	7.21	7.79	8.41		6 ×3½
5 ×4					3.24	3.76	4.29	4.76	5.26	5.76	6.26					5 ×4
5 ×3½				2.56	3.03	3.53	4.00	4.47	4.94	5.41	5.88					5 ×3½
5 ×3				2.41	2.85	3.29	3.76	4.18	4.62	5.06	5.50					5 ×3
4 ×3½				2.26	2.68	3.09	3.50	3.91	4.32	4.71	5.12					4 ×3½
4 ×3				2.09	2.50	2.88	3.26	3.65	4.06							4 ×3
3½×3				1.94	2.29	2.68	3.03	3.41	3.79							3½×3
3½×2½			1.44	1.79	2.12	2.44	2.76									3½×2½
3 ×2½			1.32	1.62	1.94	2.26	2.56									3 ×2½
2½×2		0.79	1.06	1.32	1.59	1.82	2.06									2½×2
2 ×1½		0.62	0.85	1.06	1.26											2 ×1½
2 ×1¼		0.56	0.76	0.97	1.15											2 ×1¼

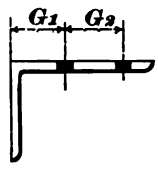
SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	SIZE

RIVETSPACING IN ANGLES, CLEARANCE FOR DRIVING ETC.

All Dimensions in Inches.



LEG	G	MAX. RIVETS
8	$4\frac{1}{2}$	$\frac{7}{8}$
7	4	"
6	$3\frac{1}{2}$	"
5	3	"
4	$2\frac{1}{4}$	"
$3\frac{1}{2}$	2	"
3	$1\frac{3}{4}$	"
$2\frac{3}{4}$	$1\frac{3}{8}$	$\frac{3}{4}$
$2\frac{1}{2}$	$1\frac{3}{8}$	$\frac{5}{8}$
$2\frac{1}{4}$	$1\frac{1}{4}$	"
2	$1\frac{1}{8}$	$\frac{1}{2}$
$1\frac{3}{4}$	1	"
$1\frac{1}{2}$	$\frac{7}{8}$	$\frac{3}{8}$
$1\frac{1}{4}$	$\frac{3}{4}$	"
1	$\frac{9}{16}$	$\frac{1}{4}$



LEG	G_1	G_2	MAX. RIVETS
8	3	3	$\frac{7}{8}$
7	$2\frac{1}{2}$	3	"
6	$2\frac{1}{4}$	$2\frac{1}{2}$	"
5	2	$1\frac{3}{4}$	"

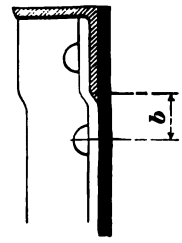
When 6" L Exceeds $\frac{3}{4}$"

6	$2\frac{1}{2}$	$2\frac{1}{4}$	$\frac{7}{8}$

Minimum Rivet Spacing

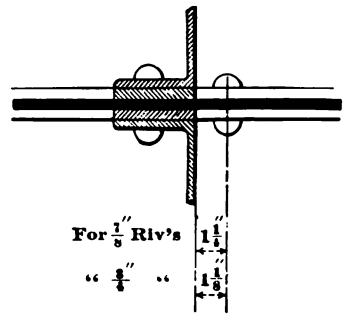
SIZE OF RIVET	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
MIMIMUM DISTANCE	1	$1\frac{1}{4}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{5}{8}$	3

Rivets in Crimped Angles



When angles are crimped, distance "b" should be $1\frac{1}{2}$" plus twice thickness of chord angles, but never less than 2"

Clearance for Rivetting

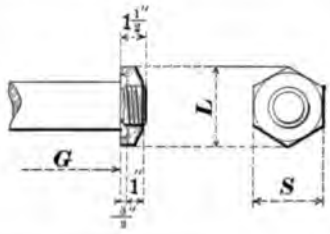
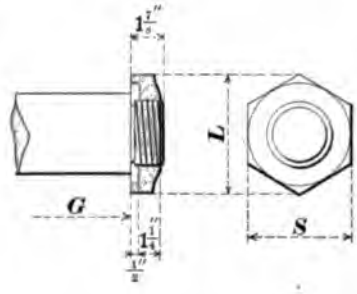
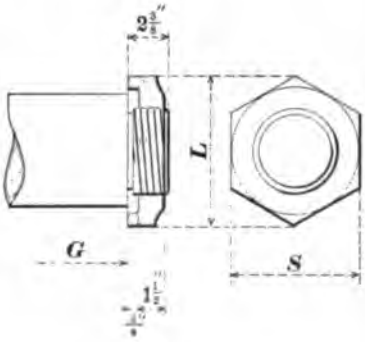


For $\frac{1}{8}$" Riv's $1\frac{1}{8}$"

" $\frac{3}{4}$" " $1\frac{3}{8}$"

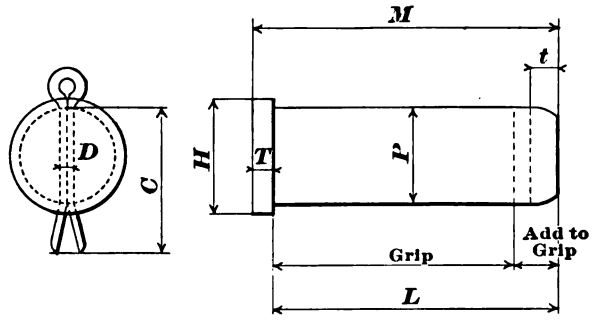
PINS WITH LOMAS NUTS.

All dimensions in inches.

DIAMETER OF PIN	PIN: SCREW DIAM.	PIN: SCREW LENGTH	PIN: ADD TO GRIP	STANDARD DIMENSIONS — 6 Threads per inch.	NUT: DIAM. OF ROUGH HOLE	NUT: SHORT DIAM. S	NUT: LONG DIAM. L	NUT: WEIGHT IN LBS.	DIAMETER OF PIN
2	1 1/2	1 1/2	1/4		1 5/16	3 1/4	3 3/4	2.5	2
2 1/4	1 1/2	1 1/2	1/4		1 5/16	3 1/4	3 3/4	2.5	2 1/4
2 1/2	2	1 1/2	1/4		1 15/16	3 3/4	4 5/16	2.5	2 1/2
2 3/4	2	1 1/2	1/4		1 15/16	3 3/4	4 5/16	2.5	2 3/4
3	2 1/2	1 1/2	1/4		2 5/16	4 1/2	5 3/16	3.0	3
3 1/4	2 1/2	1 1/2	1/4		2 5/16	4 1/2	5 3/16	3.0	3 1/4
3 1/2	2 1/2	1 1/2	1/4		2 5/16	4 1/2	5 3/16	3.0	3 1/2
3 3/4	3	1 7/8	1/2		2 15/16	5	5 3/4	5.5	3 3/4
4	3	1 7/8	1/2		2 15/16	5	5 3/4	5.5	4
4 1/4	3 1/2	1 7/8	1/2		3 5/16	5 3/4	6 5/8	7.0	4 1/4
4 1/2	3 1/2	1 7/8	1/2		3 5/16	5 3/4	6 5/8	7.0	4 1/2
4 3/4	3 1/2	1 7/8	1/2		3 5/16	5 3/4	6 5/8	7.0	4 3/4
5	4	1 7/8	1/2		3 15/16	6 1/8	7 1/2	8.5	5
5 1/4	4	1 7/8	1/2		3 15/16	6 1/2	7 1/2	8.5	5 1/4
5 1/2	4 1/2	1 7/8	1/2		4 5/16	7	8 1/8	11.0	5 1/2
5 3/4	4 1/2	1 7/8	1/2		4 5/16	7	8 1/8	11.0	5 3/4
6	4 1/2	1 7/8	1/2		4 5/16	7	8 1/8	11.0	6
6 1/4	5	2 3/8	3/4		4 15/16	7 3/4	8 15/16	12.0	6 1/4
6 1/2	5	2 3/8	3/4		4 15/16	7 3/4	8 15/16	12.0	6 1/2
6 3/4	5 1/2	2 3/8	3/4		5 5/16	8 1/4	9 1/2	13.5	6 3/4
7	5 1/2	2 3/8	3/4		5 5/16	8 1/4	9 1/2	13.5	7
7 1/4	5 1/2	2 3/8	3/4		5 5/16	8 1/4	9 1/2	13.5	7 1/4
7 1/2	5 1/2	2 3/8	3/4		5 5/16	8 1/4	9 1/2	13.5	7 1/2
7 3/4	6	2 3/8	3/4		5 15/16	9	10 5/8	17.0	7 3/4
8	6	2 3/8	3/4		5 15/16	9	10 3/8	17.0	8
8 1/4	6	2 3/8	3/4		5 15/16	9	10 3/8	17.0	8 1/4
8 1/2	6	2 3/8	3/4		5 15/16	9 1/8	10 7/8		8 1/2
8 3/4	6	2 3/8	3/4		5 15/16	10 1/8	12 1/8		8 3/4
9	6	2 3/8	3/4		5 15/16	10 1/8	12 1/8		9
9 1/4	6	2 3/8	3/4		5 15/16	10 1/8	12 1/8		9 1/4
9 1/2									9 1/2
9 3/4									9 3/4
10									10

NOTE:- To obtain grip "G" add $\frac{1}{16}$" for each bar, together with amount given in table.

COTTER PINS.



All dimensions in inches.

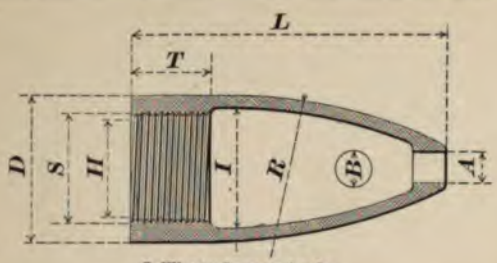
DIAMETER OF PIN	PIN		HEAD		COTTER		ADD TO GRIP		DIAMETER OF PIN
	DIAMETER OF PIN-HOLE	TAPER AT END	DIAMETER	THICKNESS	LENGTH	DIAMETER	FOR LENGTH OVER ALL	FOR LENGTH UNDER HEAD	
P		*t*	*H*	*T*	*C*	*D*	*M*	*L*	*P*
1	$1\frac{1}{32}$	$\frac{5}{16} \times \frac{1}{16}$	$1\frac{1}{4}$	$\frac{1}{4}$	$1\frac{3}{4}$	$\frac{1}{4}$	$\frac{7}{8}$	$\frac{5}{8}$	*1*
$1\frac{1}{4}$	$1\frac{9}{32}$	$\frac{5}{16} \times \frac{1}{16}$	$1\frac{1}{2}$	$\frac{1}{4}$	2	$\frac{1}{4}$	$\frac{7}{8}$	$\frac{5}{8}$	$1\frac{1}{4}$
$1\frac{1}{2}$	$1\frac{17}{32}$	$\frac{7}{16} \times \frac{3}{32}$	$1\frac{3}{4}$	$\frac{1}{4}$	$2\frac{1}{2}$	$\frac{5}{15}$	$1\frac{1}{8}$	$\frac{7}{8}$	$1\frac{1}{2}$
$1\frac{3}{4}$	$1\frac{25}{32}$	$\frac{7}{16} \times \frac{3}{32}$	2	$\frac{1}{4}$	$2\frac{3}{4}$	$\frac{5}{10}$	$1\frac{1}{8}$	$\frac{7}{8}$	$1\frac{3}{4}$
2	$2\frac{1}{32}$	$\frac{1}{2} \times \frac{1}{8}$	$2\frac{3}{8}$	$\frac{3}{8}$	3	$\frac{3}{8}$	$1\frac{3}{8}$	1	*2*
$2\frac{1}{4}$	$2\frac{9}{32}$	$\frac{1}{2} \times \frac{1}{8}$	$2\frac{5}{8}$	$\frac{3}{8}$	$3\frac{1}{4}$	$\frac{3}{8}$	$1\frac{3}{8}$	1	$2\frac{1}{4}$
$2\frac{1}{2}$	$2\frac{17}{32}$	$\frac{5}{8} \times \frac{5}{32}$	$2\frac{7}{8}$	$\frac{3}{8}$	$3\frac{3}{4}$	$\frac{7}{16}$	$1\frac{1}{2}$	$1\frac{1}{8}$	$2\frac{1}{2}$
$2\frac{3}{4}$	$2\frac{25}{32}$	$\frac{5}{8} \times \frac{5}{32}$	$3\frac{1}{8}$	$\frac{3}{8}$	4	$\frac{7}{16}$	$1\frac{1}{2}$	$1\frac{1}{8}$	$2\frac{3}{4}$
3	$3\frac{1}{32}$	$\frac{3}{4} \times \frac{3}{16}$	$3\frac{1}{2}$	$\frac{1}{2}$	5	$\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{3}{8}$	*3*
$3\frac{1}{4}$	$3\frac{9}{32}$	$\frac{3}{4} \times \frac{3}{16}$	$3\frac{3}{4}$	$\frac{1}{2}$	5	$\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{3}{8}$	$3\frac{1}{4}$
$3\frac{1}{2}$	$3\frac{17}{32}$	$\frac{7}{8} \times \frac{7}{32}$	4	$\frac{1}{2}$	6	$\frac{5}{8}$	$2\frac{1}{8}$	$1\frac{5}{8}$	$3\frac{1}{2}$
$3\frac{3}{4}$	$3\frac{25}{32}$	$\frac{7}{8} \times \frac{7}{32}$	$4\frac{1}{4}$	$\frac{1}{2}$	6	$\frac{5}{8}$	$2\frac{1}{8}$	$1\frac{5}{8}$	$3\frac{3}{4}$

NOTE:- Use pins with lomas nuts, in preference to cotter pins, whenever possible.

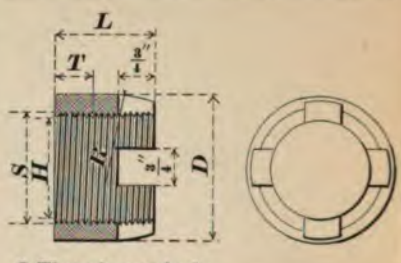
PILOT NUTS.

Cast Steel.

All dimensions in inches.



6 Threads per inch.



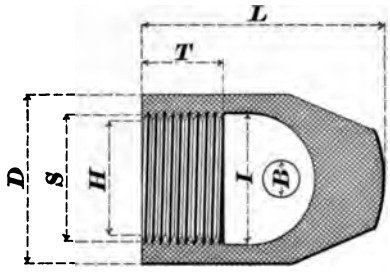
6 Threads per inch.

DIAM. OF PIN D	DIAM. OF SCREW S	SIZE OF ROUGH HOLE H	LENGTH OF THREAD T	LENGTH OVER ALL L	INSIDE DIAM. I	RADIUS R	DIAM. OF HOLE A	DIAM. OF HOLE B	PAT. NO.
2	1 1/2	1 5/16	1 5/8	5	1 5/8	8 1/2	1/2	1/2	L 8
2 1/4	1 1/2	1 5/16	1 5/8	5 1/4	1 5/8	8 1/2	1/2	1/2	L 9
2 1/2	2	1 13/16	1 5/8	5 3/4	2 1/8	10 1/2	5/8	5/8	L10
2 3/4	2	1 13/16	1 5/8	6	2 1/4	10 1/2	5/8	5/8	L11
3	2 1/2	2 5/16	1 5/8	6 1/2	2 5/8	12	3/4	3/4	L12
3 1/4	2 1/2	2 5/16	1 5/8	6 3/4	2 3/4	12	3/4	3/4	L13
3 1/2	2 1/2	2 5/16	1 5/8	7	3	12	3/4	3/4	L14
3 3/4	3	2 13/16	2	8 1/4	3 1/8	15 1/2	7/8	7/8	L15
4	3	2 13/16	2	8 1/2	3 3/8	15 1/2	7/8	7/8	L16
4 1/4	3 1/2	3 5/16	2	8 3/4	3 5/8	15 1/2	7/8	7/8	L17
4 1/2	3 1/2	3 5/16	2	9	3 3/4	15 1/2	7/8	7/8	L18
4 3/4	3 1/2	3 5/16	2	9 1/4	4	15 1/2	7/8	7/8	L19
5	4	3 13/16	2	9 1/2	4 1/4	16 1/2	1	1	L20
5 1/4	4	3 13/16	2	9 3/4	4 1/2	16 1/2	1	1	L21
5 1/2	4 1/2	4 5/16	2	10 1/2	4 5/8	20 1/2	1 1/4	1	L22
5 3/4	4 1/2	4 5/16	2	10 3/4	4 7/8	20 1/2	1 1/4	1	L23
6	4 1/2	4 5/16	2	11	5 1/8	20 1/2	1 1/4	1	L24
6 1/4	5	4 13/16	2 1/2	11 3/4	5 3/8	20 1/2	1 1/4	1	L25
6 1/2	5	4 13/16	2 1/2	12	5 5/8	20 1/2	1 1/4	1	L26
6 3/4	5 1/2	5 5/16	2 1/2	12 1/4	5 3/4	20 1/2	1 1/4	1	L27
7	5 1/2	5 5/16	2 1/2	12 1/2	6	21	1 1/4	1	L28
7 1/4	5 1/2	5 5/16	2 1/2	12 3/4	6 1/4	21	1 1/4	1	L29
7 1/2	5 1/2	5 5/16	2 1/2	13	6 1/2	21	1 1/4	1	L30
7 3/4	6	5 13/16	2 1/2	13 1/2	6 1/2	23	1 1/2	1 1/4	L31
8	6	5 13/16	2 1/2	13 3/4	6 3/4	23	1 1/2	1 1/4	L32
8 1/4	6	5 13/16	2 1/2	14	7	23	1 1/2	1 1/4	L33
8 1/2	6	5 13/16	2 1/2	14 1/4	7 1/4	23	1 1/2	1 1/4	L34

PAT. NO.	RADIUS R	STRAIGHT PORTION T	LENGTH OVER ALL L	SIZE OF ROUGH HOLE H	DIAM. OF SCREW S	DIAM. OF PIN D
S 8	4 3/4	3/4	2	1 5/16	1 1/2	2
S 9	3 1/2	3/4	2	1 5/16	1 1/2	2 1/4
S10	4 3/4	3/4	2	1 13/16	2	2 1/2
S11	3 1/2	3/4	2	1 13/16	2	2 3/4
S12	4 3/4	3/4	2	2 5/16	2 1/2	3
S13	3 1/2	3/4	2	2 5/16	2 1/2	3 1/4
S14	2 1/2	3/4	2	2 5/16	2 1/2	3 1/2
S15	4 1/2	1	2 1/2	2 13/16	3	3 3/4
S16	3 1/2	1	2 1/2	2 13/16	3	4
S17	4 1/2	1	2 1/2	3 5/16	3 1/2	4 1/4
S18	3 1/2	1	2 1/2	3 5/16	3 1/2	4 1/2
S19	3	1	2 1/2	3 5/16	3 1/2	4 3/4
S20	4	1	2 1/2	3 13/16	4	5
S21	3	1	2 1/2	3 13/16	4	5 1/4
S22	4	1	2 1/2	4 5/16	4 1/2	5 1/2
S23	3	1	2 1/2	4 5/16	4 1/2	5 3/4
S24	2 1/2	1	2 1/2	4 5/16	4 1/2	6
S25	4 1/2	1 1/4	3	4 13/16	5	6 1/4
S26	3 1/2	1 1/4	3	4 13/16	5	6 1/2
S27	4 1/2	1 1/4	3	5 5/16	5 1/2	6 3/4
S28	3 1/2	1 1/4	3	5 5/16	5 1/2	7
S29	3	1 1/4	3	5 5/16	5 1/2	7 1/4
S30	3	1 1/4	3	5 5/16	5 1/2	7 1/2
S31	3 1/2	1 1/4	3	5 13/16	6	7 3/4
S32	3 1/4	1 1/4	3	5 13/16	6	8
S33	3	1 1/4	3	5 13/16	6	8 1/4
S34	2 3/4	1 1/4	3	5 13/16	6	8 1/2

DRIVING NUTS.

Cast Steel.



6 threads per inch

DIAMETER D	DIAMETER OF SCREW S	SIZE OF ROUGH HOLE H	LENGTH OF THREAD T	LENGTH OVER ALL L	INSIDE DIAMETER I	DIAMETER OF HOLE B	PAT. NO.
INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	
$2\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{5}{16}$	$1\frac{5}{8}$	4	$1\frac{5}{8}$	$\frac{1}{2}$	D 3
$2\frac{3}{4}$	2	$1\frac{13}{16}$	$1\frac{5}{8}$	$4\frac{3}{8}$	$2\frac{1}{8}$	$\frac{5}{8}$	D 4
$3\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{5}{16}$	$1\frac{5}{8}$	5	$2\frac{3}{4}$	$\frac{3}{4}$	D 5
4	3	$2\frac{13}{16}$	2	$5\frac{1}{4}$	$3\frac{1}{4}$	$\frac{7}{8}$	D 6
$4\frac{3}{4}$	$3\frac{1}{2}$	$3\frac{5}{16}$	2	$5\frac{7}{8}$	$3\frac{3}{4}$	"	D 7
$5\frac{1}{4}$	4	$3\frac{13}{16}$	2	$6\frac{1}{4}$	$4\frac{1}{4}$	1	D 8
6	$4\frac{1}{2}$	$4\frac{5}{16}$	2	$6\frac{3}{4}$	$4\frac{3}{4}$	"	D 9
$6\frac{1}{2}$	5	$4\frac{13}{16}$	$2\frac{1}{2}$	$7\frac{1}{8}$	$5\frac{1}{4}$	"	D10
$7\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{5}{16}$	$2\frac{1}{2}$	$7\frac{5}{8}$	$5\frac{3}{4}$	"	D11
$8\frac{1}{2}$	6	$5\frac{13}{16}$	$2\frac{1}{2}$	$7\frac{7}{8}$	$6\frac{1}{4}$	"	D12

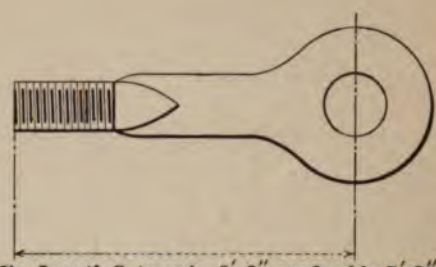
MAXIMUM BENDING MOMENTS ON PINS

PIN		MOMENTS IN INCH POUNDS FOR FIBRE STRAINS PER SQ. IN. OF					PIN	
DIAM. INCHES	AREA	15,000	18,000	20,000	22,000	25,000	AREA	DIAM. INCHES
1	0.785	1470	1770	1960	2160	2450	0.785	1
1¼	1.227	2880	3450	3830	4220	4790	1.227	1¼
1½	1.767	4970	5960	6630	7290	8280	1.767	1½
1¾	2.405	7890	9470	10500	11570	13200	2.405	1¾
2	3.142	11800	14100	15700	17280	19600	3.142	2
2¼	3.976	16800	20100	22400	24600	28000	3.976	2¼
2½	4.909	23000	27600	30700	33700	38400	4.909	2½
2¾	5.940	30600	36800	40800	44900	51000	5.940	2¾
3	7.069	39800	47700	53000	58300	66300	7.069	3
3¼	8.296	50600	60700	67400	74100	84300	8.296	3¼
3½	9.621	63100	75800	84200	92600	105200	9.621	3½
3¾	11.045	77700	93200	103500	113900	129400	11.045	3¾
4	12.566	94200	113100	125700	138200	157100	12.566	4
4¼	14.186	113000	135700	150700	165800	188400	14.186	4¼
4½	15.904	134200	161000	178900	196800	223700	15.904	4½
4¾	17.721	157800	189400	210400	231500	263000	17.721	4¾
5	19.635	184100	220900	245400	270000	306800	19.635	5
5¼	21.648	213100	255700	284100	312500	355200	21.648	5¼
5½	23.758	245000	294000	326700	359300	408300	23.758	5½
5¾	25.967	280000	335900	373300	410600	466600	25.967	5¾
6	28.274	318100	381700	424100	466500	530200	28.274	6
6¼	30.680	359500	431400	479400	527300	599200	30.680	6¼
6½	33.183	404400	485300	539200	593100	674000	33.183	6½
6¾	35.785	452900	543500	603900	664200	754800	35.785	6¾
7	38.485	505100	606100	673500	740800	841900	38.485	7
7¼	41.282	561200	673400	748200	823000	935300	41.282	7¼
7½	44.179	621300	745500	828400	911200	1035400	44.179	7½
7¾	47.173	685500	822600	914000	1005300	1142500	47.173	7¾
8	50.265	754000	904800	1005300	1105800	1256600	50.265	8
8¼	53.456	826900	992300	1102500	1212800	1378200	53.456	8¼
8½	56.745	904400	1085200	1205800	1326400	1507300	56.745	8½
8¾	60.132	986500	1183800	1315400	1446900	1644200	60.132	8¾
9	63.617	1073500	1288200	1431400	1574500	1789200	63.617	9
9¼	67.201	1165500	1398600	1554000	1709400	1942500	67.201	9¼
9½	70.882	1262600	1515100	1683400	1851800	2104300	70.882	9½
9¾	74.662	1364900	1637900	1819900	2001900	2274900	74.662	9¾
10	78.540	1472600	1767100	1963500	2159900	2454400	78.540	10
10¼	82.520	1585900	1903000	2114500	2325900	2643100	82.520	10¼
10½	86.590	1704700	2045700	2273000	2500200	2841200	86.590	10½
10¾	90.760	1829400	2195300	2439300	2683200	3049100	90.760	10¾
11	95.030	1960100	2352100	2613400	2874800	3266800	95.030	11
11¼	99.400	2096800	2516100	2795700	3075400	3494800	99.400	11¼
11½	103.870	2239700	2687600	2986300	3284800	3732800	103.870	11½
11¾	108.430	2388900	2866600	3185200	3503700	3981500	108.430	11¾
12	113.100	2544700	3053600	3392900	3732190	4241200	113.100	12

EYE BARS

Ordinary

Adjustable



Min. Length C. to end 6′ 6″, preferably 7′ 0″

WIDTH OF BAR	MIN. THICKNESS OF BAR	HEAD			SCREW END			THICKNESS OF BAR	WIDTH OF BAR
		DIAM.	MAX. PIN.	ADD'L MATERIAL FOR HEAD	ADD'L MATERIAL FOR UPSET	DIAM.	LENGTH		
INS.	INS.	INS.	INS.	FT. & INS.	FT. & INS.	INS.	INS.	INS.	INS.
2	5/8	4 1/8	1 3/4	0 - 7 1/2	0 - 7	2	5	15/16	2
	"	5 1/2	2 3/4	1 - 0 1/2					
2 1/2	3/4	5 1/2	2 1/4	0 - 9 1/2	1 - 1	2 1/4	5	15/16 to 1 1/16	2 1/2
	"	6 1/2	3 1/4	1 - 1 1/2					
3	3/4	7	3	1 - 3	1 - 5	2 1/2	5 1/2	1 to 1 1/16	3
	"	8	4	1 - 6	1 - 5	2 3/4	6	1 1/8 to 1 1/4	
4	3/4	9 1/2	4 1/4	1 - 8	1 - 8	3	6	1 to 1 1/8	4
	"	10 1/2	5 1/4	1 - 10	1 - 8	3 1/4	6 1/2	1 3/16 to 1 3/8	
5	3/4	11 1/2	5	1 - 9	1 - 9	3 1/4	6 1/2	1 to 1 1/16	5
	1	12 1/2	6	2 - 1	1 - 9	3 1/2	7	1 1/8 to 1 1/4	
6	3/4	13 1/2	5 1/2	1 - 11	1 - 11	3 3/4	8	1 1/8 to 1 3/16	6
	1	14 1/2	6 1/2	2 - 2	1 - 11	4	8	1 1/4 to 1 3/8	
7	7/8	16	6 3/4	2 - 3	2 - 3	4 1/4	9	1 1/4 to 1 5/16	7
	15/16	17	7 3/4	2 - 8	2 - 3	4 1/2	9	1 3/8 to 1 1/2	
8	1	17	6 1/2	2 - 3					8
	1 1/16	18	7 1/2	2 - 6					
	1 1/8	18 1/2	8	2 - 10					
9	1 1/8	19 1/2	7 3/4	2 - 6					9
	"	21 1/2	9 3/4	3 - 1					
10	1 3/8	22	9	2 - 11					10
	"	23	10	3 - 3					
12									12

Note: Eye bars are hydraulic forged, and are guaranteed to develop the full strength of the bar, under conditions given in the above table, when tested to destruction.

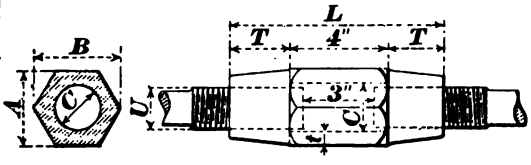
STANDARD UPSETS.

For Round and Square Bars.

ROUND ◯ BARS							SQUARE □ BARS						
ROUND		UPSET					UPSET					SQUARE	
DIAM.	AREA	DIAM.	LENGTH	ADD	AREA AT ROOT	EXCESS AREA	EXCESS AREA	AREA AT ROOT	ADD	LENGTH	DIAM.	AREA	DIAM.
INCHES	SQ. INS.	INCHES	INCHES	INCHES	SQ. INS.	%	%	SQ. INS.	INCHES	INCHES	INCHES	SQ. INS.	INCHES
$\frac{5}{8}$	0.307	$\frac{7}{8}$	4	$4\frac{1}{2}$	0.420	36.8							$\frac{5}{8}$
$\frac{3}{4}$	0.442	1	4	$3\frac{7}{8}$	0.550	24.4	20 6	0.694	$3\frac{1}{2}$	4	$1\frac{1}{8}$	0.563	$\frac{3}{4}$
$\frac{7}{8}$	0.601	$1\frac{1}{4}$	4	5	0.891	48.3	16.3	0.891	4	4	$1\frac{1}{4}$	0.766	$\frac{7}{8}$
1	0.785	$1\frac{3}{8}$	4	$4\frac{5}{8}$	1.057	34.7	29.5	1.295	4	4	$1\frac{1}{2}$	1.000	1
$1\frac{1}{8}$	0.994	$1\frac{1}{2}$	4	$3\frac{7}{8}$	1.295	30.3	19.7	1.515	$4\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{5}{8}$	1.266	$1\frac{1}{8}$
$1\frac{1}{4}$	1.227	$1\frac{5}{8}$	$4\frac{1}{2}$	$3\frac{7}{8}$	1.515	23.5	31.1	2.049	$4\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{7}{8}$	1.563	$1\frac{1}{4}$
$1\frac{3}{8}$	1.485	$1\frac{3}{4}$	$4\frac{1}{2}$	$3\frac{1}{2}$	1.744	17.4	21.7	2.302	$4\frac{1}{2}$	5	2	1.891	$1\frac{3}{8}$
$1\frac{1}{2}$	1.767	2	5	$4\frac{5}{8}$	2.302	30.3	34.0	3.023	$4\frac{3}{4}$	5	$2\frac{1}{4}$	2.250	$1\frac{1}{2}$
$1\frac{5}{8}$	2.074	$2\frac{1}{8}$	5	$4\frac{1}{4}$	2.651	27.8	29.6	3.410	$4\frac{5}{8}$	$5\frac{1}{2}$	$2\frac{3}{8}$	2.641	$1\frac{5}{8}$
$1\frac{3}{4}$	2.405	$2\frac{1}{4}$	5	4	3.023	25.7	21.3	3.716	$4\frac{1}{4}$	$5\frac{1}{2}$	$2\frac{1}{2}$	3.063	$1\frac{3}{4}$
$1\frac{7}{8}$	2.761	$2\frac{3}{8}$	$5\frac{1}{2}$	$4\frac{1}{2}$	3.410	23.9	31.4	4.619	$5\frac{1}{2}$	6	$2\frac{3}{4}$	3.516	$1\frac{7}{8}$
2	3.142	$2\frac{1}{2}$	$5\frac{1}{2}$	$3\frac{7}{8}$	3.716	18.3	27.7	5.107	$4\frac{3}{4}$	6	$2\frac{7}{8}$	4.000	2
$2\frac{1}{8}$	3.547	$2\frac{5}{8}$	$5\frac{1}{2}$	$3\frac{5}{8}$	4.155	17.1	20.2	5.430	$4\frac{3}{8}$	6	3	4.516	$2\frac{1}{8}$
$2\frac{1}{4}$	3.976	$2\frac{7}{8}$	6	$4\frac{3}{8}$	5.107	28.5	28.6	6.510	$5\frac{1}{2}$	$6\frac{1}{2}$	$3\frac{1}{4}$	5.063	$2\frac{1}{4}$
$2\frac{3}{8}$	4.430	3	6	$4\frac{3}{8}$	5.430	22.6	33.8	7.548	$6\frac{1}{2}$	7	$3\frac{1}{2}$	5.641	$2\frac{3}{8}$
$2\frac{1}{2}$	4.909	$3\frac{1}{8}$	$6\frac{1}{2}$	$4\frac{5}{8}$	5.957	21.3	30.7	8.170	$6\frac{1}{4}$	8	$3\frac{3}{8}$	6.250	$2\frac{1}{2}$
$2\frac{5}{8}$	5.412	$3\frac{1}{4}$	$6\frac{1}{2}$	$4\frac{1}{4}$	6.510	20.3	35.0	9.305	$6\frac{3}{4}$	8	$3\frac{7}{8}$	6.891	$2\frac{5}{8}$
$2\frac{3}{4}$	5.940	$3\frac{3}{8}$	7	$4\frac{1}{4}$	7.088	19.3	32.1	9.994	6	8	4	7.563	$2\frac{3}{4}$
$2\frac{7}{8}$	6.492	$3\frac{5}{8}$	8	$5\frac{1}{2}$	8.170	25.9	37.0	11.329	8	9	$4\frac{1}{4}$	8.266	$2\frac{7}{8}$
3	7.069	$3\frac{3}{4}$	8	$5\frac{1}{4}$	8.641	22.2	41.7	12.753	$7\frac{1}{2}$	9	$4\frac{1}{2}$	9.000	3
$3\frac{1}{8}$	7.670	$3\frac{7}{8}$	8	$5\frac{1}{8}$	9.305	21.3							$3\frac{1}{8}$
$3\frac{1}{4}$	8.296	4	8	$4\frac{7}{8}$	9.994	20.7							$3\frac{1}{4}$
$3\frac{1}{2}$	9.621	$4\frac{1}{4}$	9	$5\frac{1}{4}$	11.329	17.7							$3\frac{1}{2}$
$3\frac{3}{4}$	11.045	$4\frac{1}{2}$	9	$4\frac{3}{4}$	12.753	15.5							$3\frac{3}{4}$

SLEEVE NUTS AND TURNBUCKLES.

All Dimensions in Inches.



Manufactured by the Cleveland City Forge & Iron Company, Cleveland, Ohio.

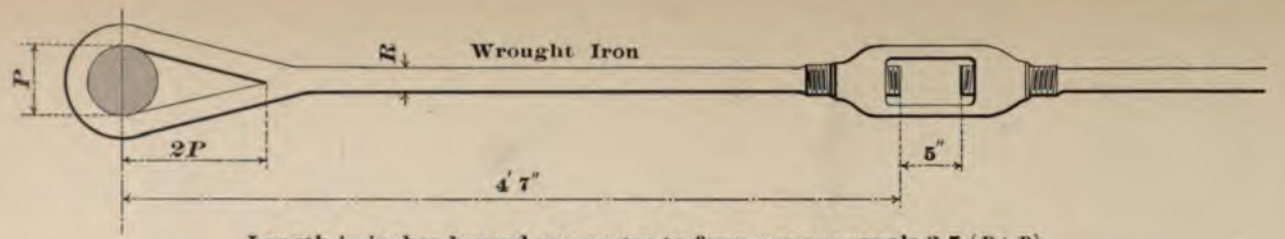
Standard Length X — 6".
Extra Lengths, 9", 12", 18", 24", 30", 48" & 72" (Special Prices).

DIAM. OF SCREW U	LENGTH OF THREAD T	LENGTH OF NUT L	SHORT DIAM. A	LONG DIAM. B	INSIDE DIAM. C	THICKNESS t	WEIGHT IN LBS.	WEIGHT IN LBS.	STANDARD DIMENSIONS t	A	B	C	L	T	DIAM. OF SCREW U
$\frac{7}{8}$	$1\frac{1}{2}$	7	$1\frac{5}{8}$	$1\frac{7}{8}$	$1\frac{1}{8}$	$\frac{1}{4}$	$2\frac{3}{4}$	$2\frac{1}{2}$	$\frac{3}{8}$	$1\frac{1}{4}$	$2\frac{1}{4}$	$1\frac{1}{4}$	$8\frac{5}{8}$	$1\frac{6}{16}$	$\frac{7}{8}$
1	$1\frac{1}{2}$	7	$1\frac{5}{8}$	$1\frac{7}{8}$	$1\frac{1}{8}$	$\frac{1}{4}$	3	$3\frac{1}{2}$	$\frac{7}{16}$	"	$2\frac{7}{16}$	$1\frac{5}{16}$	9	$1\frac{1}{2}$	1
$1\frac{1}{8}$	$1\frac{3}{4}$	$7\frac{1}{2}$	2	$2\frac{5}{16}$	$1\frac{3}{8}$	$\frac{5}{16}$	$3\frac{1}{2}$	4	$\frac{1}{2}$	"	$2\frac{9}{16}$	$1\frac{7}{16}$	$9\frac{3}{8}$	$1\frac{11}{16}$	$1\frac{1}{8}$
$1\frac{1}{4}$	"	"	"	"	"	"	4	$5\frac{1}{4}$	"	$1\frac{1}{2}$	$2\frac{3}{4}$	$1\frac{9}{16}$	$9\frac{3}{4}$	$1\frac{7}{8}$	$1\frac{1}{4}$
$1\frac{3}{8}$	2	8	$2\frac{3}{8}$	$2\frac{3}{4}$	$1\frac{5}{8}$	$\frac{3}{8}$	$4\frac{1}{2}$	6	"	$1\frac{5}{8}$	$3\frac{1}{16}$	$1\frac{11}{16}$	$10\frac{1}{8}$	$2\frac{1}{16}$	$1\frac{3}{8}$
$1\frac{1}{2}$	"	"	"	"	"	"	$6\frac{1}{2}$	7	$\frac{5}{8}$	"	$3\frac{3}{16}$	$1\frac{3}{4}$	$10\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{1}{2}$
$1\frac{5}{8}$	$2\frac{1}{4}$	$8\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{3}{16}$	$1\frac{7}{8}$	$\frac{7}{16}$	8	$8\frac{1}{2}$	"	$1\frac{3}{4}$	$3\frac{1}{2}$	2	$10\frac{7}{8}$	$2\frac{7}{16}$	$1\frac{5}{8}$
$1\frac{3}{4}$	"	"	"	"	"	"	$8\frac{1}{2}$	10	"	2	$3\frac{3}{4}$	$2\frac{1}{8}$	$11\frac{1}{4}$	$2\frac{5}{8}$	$1\frac{3}{4}$
$1\frac{7}{8}$	$2\frac{1}{2}$	9	$3\frac{1}{8}$	$3\frac{5}{8}$	$2\frac{1}{8}$	$\frac{1}{2}$	10	$11\frac{1}{2}$	$\frac{11}{16}$	"	$3\frac{7}{8}$	$2\frac{5}{16}$	$11\frac{5}{8}$	$2\frac{13}{16}$	$1\frac{7}{8}$
2	"	"	"	"	"	"	11	13	"	$2\frac{1}{4}$	$4\frac{1}{4}$	$2\frac{3}{8}$	12	3	2
$2\frac{1}{8}$	$2\frac{3}{4}$	$9\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{16}$	$2\frac{3}{8}$	$\frac{9}{16}$	14	15	$\frac{23}{32}$	$2\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{1}{2}$	$12\frac{3}{8}$	$3\frac{3}{16}$	$2\frac{1}{8}$
$2\frac{1}{4}$	"	"	"	"	"	"	15	18	$\frac{13}{16}$	"	$4\frac{3}{4}$	$2\frac{11}{16}$	$12\frac{3}{4}$	$3\frac{5}{8}$	$2\frac{1}{4}$
$2\frac{3}{8}$	3	10	$3\frac{7}{8}$	$4\frac{1}{2}$	$2\frac{5}{8}$	$\frac{5}{8}$	18	20	"	$2\frac{3}{4}$	$4\frac{7}{8}$	$2\frac{3}{4}$	$13\frac{1}{8}$	$3\frac{5}{16}$	$2\frac{3}{8}$
$2\frac{1}{2}$	"	"	"	"	"	"	19	24	$\frac{27}{32}$	3	$5\frac{3}{8}$	$3\frac{1}{16}$	$13\frac{1}{2}$	$3\frac{3}{4}$	$2\frac{1}{2}$
$2\frac{5}{8}$	$3\frac{1}{4}$	$10\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{13}{16}$	$2\frac{7}{8}$	$\frac{11}{16}$	22	28	$\frac{15}{16}$	"	$5\frac{5}{16}$	$3\frac{1}{8}$	$13\frac{7}{8}$	$3\frac{15}{16}$	$2\frac{5}{8}$
$2\frac{3}{4}$	"	"	"	"	"	"	23	30	"	$3\frac{1}{4}$	$5\frac{5}{4}$	$3\frac{1}{4}$	$14\frac{1}{4}$	$4\frac{1}{8}$	$2\frac{3}{4}$
$2\frac{7}{8}$	$3\frac{1}{2}$	11	$4\frac{5}{8}$	$5\frac{3}{8}$	$3\frac{1}{8}$	$\frac{3}{4}$	27	34	$1\frac{1}{32}$	"	$6\frac{1}{16}$	$3\frac{7}{16}$	$14\frac{5}{8}$	$4\frac{5}{16}$	$2\frac{7}{8}$
3	"	"	"	"	"	"	28	38	"	$3\frac{1}{2}$	$6\frac{3}{8}$	$3\frac{5}{8}$	15	$4\frac{1}{2}$	3
$3\frac{1}{8}$	$3\frac{3}{4}$	$11\frac{1}{2}$	5	$5\frac{13}{16}$	$3\frac{3}{8}$	$\frac{13}{16}$	34								$3\frac{1}{8}$
$3\frac{1}{4}$	"	"	"	"	"	"	35	50	$1\frac{1}{16}$	4	$6\frac{3}{4}$	$3\frac{7}{8}$	$15\frac{3}{4}$	$4\frac{7}{8}$	$3\frac{1}{4}$
$3\frac{3}{8}$	4	12	$5\frac{3}{8}$	$6\frac{1}{8}$	$3\frac{5}{8}$	$\frac{7}{8}$	39								$3\frac{3}{8}$
$3\frac{1}{2}$	"	"	"	"	"	"	40	65	$1\frac{7}{32}$	4	$7\frac{1}{4}$	$4\frac{1}{4}$	$16\frac{1}{2}$	$5\frac{1}{4}$	$3\frac{1}{2}$
$3\frac{5}{8}$	$4\frac{1}{4}$	$12\frac{1}{2}$	$5\frac{3}{4}$	$6\frac{11}{16}$	$3\frac{7}{8}$	$\frac{15}{16}$	45								$3\frac{5}{8}$
$3\frac{3}{4}$	"	"	"	"	"	"	47		$1\frac{5}{16}$	5	$8\frac{1}{4}$	$4\frac{7}{16}$	18	6	$3\frac{3}{4}$
$3\frac{7}{8}$	$4\frac{1}{2}$	13	$6\frac{1}{8}$	$7\frac{1}{8}$	$4\frac{1}{8}$	1	52								$3\frac{7}{8}$
4	"	"	"	"	"	"	55		$1\frac{7}{16}$	5	$8\frac{3}{4}$	$4\frac{5}{8}$	18	6	4
$4\frac{1}{4}$	$4\frac{3}{4}$	$13\frac{1}{2}$	$6\frac{1}{2}$	$7\frac{9}{16}$	$4\frac{3}{8}$	$1\frac{1}{16}$	65								$4\frac{1}{4}$
$4\frac{1}{2}$	5	14	$6\frac{7}{8}$	8	$4\frac{3}{4}$	$1\frac{1}{16}$	75								$4\frac{1}{2}$

LOOP RODS.

Allowance for Eye, Square or Round Bars.

All Dimensions in Inches.



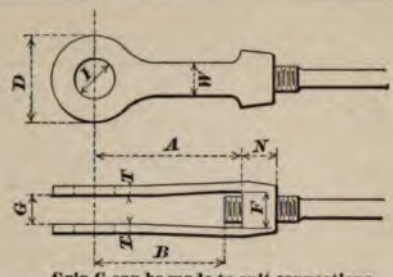
Length in inches beyond pin centre to form one eye equals 3.7 (P + R)

DIAM. OF PINS	DIAM. OR SIDE OF BARS																		DIAM. OF PINS
	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3	
1	11 1/2	12	12 1/2																	1
1 1/4	12 1/2	12 7/8	13 3/8	13 7/8	14 1/4															1 1/4
1 1/2	13 3/8	13 7/8	14 1/4	14 3/4	15 1/4	15 3/8	16 1/8													1 1/2
1 3/4	14 1/4	14 3/4	15 1/4	15 3/8	16 1/8	16 3/8	17	17 1/2	18											1 3/4
2	15 1/4	15 3/8	16 1/8	16 3/8	17	17 1/2	18	18 3/8	18 7/8	19 3/8	19 3/4									2
2 1/4	16 1/8	16 3/8	17	17 1/2	18	18 3/8	18 7/8	19 3/8	19 3/4	20 1/4	20 3/4	21 1/8	21 3/8							2 1/4
2 1/2	17	17 1/4	18	18 3/8	18 7/8	19 3/8	19 3/4	20 1/4	20 3/4	21 1/8	21 3/8	22 1/8	22 3/8	23	23 1/8					2 1/2
2 3/4	18	18 3/8	18 7/8	19 3/8	19 3/4	20 1/4	20 3/4	21 1/8	21 3/8	22 1/8	22 3/8	23	23 1/2	24	24 3/8	24 7/8	25 3/8			2 3/4
3	18 7/8	19 3/8	19 3/4	20 1/4	20 3/4	21 1/8	21 3/8	22 1/8	22 3/8	23	23 1/2	24	24 3/8	24 7/8	25 3/8	25 7/8	26 1/4	26 3/4	27 1/4	3
3 1/4	19 3/4	20 1/4	20 3/4	21 1/8	21 3/8	22 1/8	22 3/8	23	23 1/2	24	24 3/8	24 7/8	25 3/8	25 7/8	26 1/4	26 3/4	27 1/4	27 3/8	28 1/8	3 1/4
3 1/2	20 3/4	21 1/8	21 3/8	22 1/8	22 3/8	23	23 1/2	24	24 3/8	24 7/8	25 3/8	25 7/8	26 1/4	26 3/4	27 1/4	27 3/8	28 1/8	28 3/8	29	3 1/2
3 3/4	21 3/8	22 1/8	22 3/8	23	23 1/2	24	24 3/8	24 7/8	25 3/8	25 7/8	26 1/4	26 3/4	27 1/4	27 3/8	28 1/8	28 3/8	29	29 1/2	30	3 3/4
4	22 3/8	23	23 1/2	24	24 3/8	24 7/8	25 3/8	25 7/8	26 1/4	26 3/4	27 1/4	27 3/8	28 1/8	28 3/8	29	29 1/2	30	30 1/2	31	4
4 1/4	23 1/2	24	24 3/8	24 7/8	25 3/8	25 7/8	26 1/4	26 3/4	27 1/4	27 3/8	28 1/8	28 3/8	29	29 1/2	30	30 1/2	31	31 3/8	31 7/8	4 1/4
4 1/2	24 3/8	24 7/8	25 3/8	25 7/8	26 1/4	26 3/4	27 1/4	27 3/8	28 1/8	28 3/8	29	29 1/2	30	30 1/2	31	31 3/8	31 7/8	32 1/4	32 3/4	4 1/2
4 3/4	25 3/8	25 7/8	26 1/4	26 3/4	27 1/4	27 3/8	28 1/8	28 3/8	29	29 1/2	30	30 1/2	31	31 3/8	31 7/8	32 1/4	32 3/4	33 1/4	33 3/8	4 3/4
5	26 1/4	26 3/4	27 1/4	27 3/8	28 1/8	28 3/8	29	29 1/2	30	30 1/2	31	31 3/8	31 7/8	32 1/4	32 3/4	33 1/4	33 3/8	34 1/8	34 3/8	5
5 1/4	27 1/4	27 3/8	28 1/8	28 3/8	29	29 1/2	30	30 1/2	31	31 3/8	31 7/8	32 1/4	32 3/4	33 1/4	33 3/8	34 1/8	34 3/8	35	35 1/2	5 1/4
5 1/2	28 1/8	28 3/8	29	29 1/2	30	30 1/2	31	31 3/8	31 7/8	32 1/4	32 3/4	33 1/4	33 3/8	34 1/8	34 3/8	35	35 1/2	36	36 1/2	5 1/2
5 3/4	29	29 1/2	30	30 1/2	31	31 3/8	31 7/8	32 1/4	32 3/4	33 1/4	33 3/8	34 1/8	34 3/8	35	35 1/2	36	36 1/2	37	37 3/8	5 3/4
6	30	30 1/2	31	31 3/8	31 7/8	32 1/4	32 3/4	33 1/4	33 3/8	34 1/8	34 3/8	35	35 1/2	36	36 1/2	37	37 3/8	37 7/8	38 3/8	6

NOTE: Maximum shipping length should not exceed 35 feet.

CLEVIS

All dimensions in inches.



Grip G can be made to suit connections.

DIAM. OF CLEVIS *D*	MAX. PIN *P*	CLEVIS FORK *F*	NUT *N*	WIDTH *W*	THICKNESS *T*	*A*	*B*	DIAM. OF CLEVIS *D*
3	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$\frac{3}{8}$	6	5	3
4	$2\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$\frac{1}{2}$	9	8	4
5	3	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$\frac{5}{8}$	9	8	5
6	$3\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$\frac{3}{4}$	9	8	6
7	4	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{4}$	$\frac{7}{8}$	9	8	7

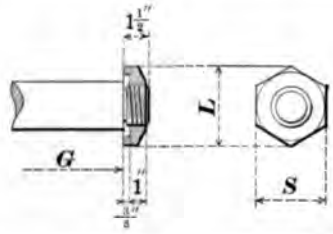
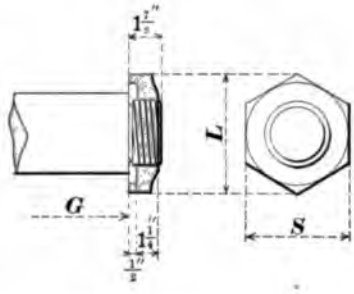
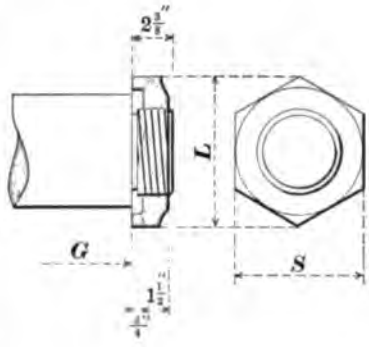
Table giving diameter of Clevis for given rod and pin.

ROD ROUND	ROD SQUARE	ROD UPSET	PINS 1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	4	ROD UPSET	ROD SQUARE	ROD ROUND
$\frac{3}{4}$	$\frac{5}{8}$	1	3	3	3											1	$\frac{5}{8}$	$\frac{5}{8}$
	$\frac{3}{4}$	$1\frac{1}{8}$	3	3	3	4	4	4								$1\frac{1}{8}$	$\frac{3}{4}$	
$\frac{7}{8}$	$\frac{7}{8}$	$1\frac{1}{4}$		4	4	4	4	4								$1\frac{1}{4}$	$\frac{7}{8}$	$\frac{7}{8}$
1		$1\frac{3}{8}$		4	4	4	4	4								$1\frac{3}{8}$		1
$1\frac{1}{8}$	1	$1\frac{1}{2}$		4	4	4	4	4	5	5	5					$1\frac{1}{2}$	1	$1\frac{1}{8}$
$1\frac{1}{4}$	$1\frac{1}{8}$	$1\frac{5}{8}$			4	4	5	5	5	5	5					$1\frac{5}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$
$1\frac{3}{8}$		$1\frac{3}{4}$			5	5	5	5	5	5	5					$1\frac{3}{4}$		$1\frac{3}{8}$
	$1\frac{1}{4}$	$1\frac{7}{8}$			5	5	5	5	5	5	5					$1\frac{7}{8}$	$1\frac{1}{4}$	
$1\frac{1}{2}$	$1\frac{3}{8}$	2				5	5	5	5	5	6	6	6			2	$1\frac{3}{8}$	$1\frac{1}{2}$
$1\frac{5}{8}$		$2\frac{1}{8}$				5	5	5	5	6	6	6	6			$2\frac{1}{8}$		$1\frac{5}{8}$
$1\frac{3}{4}$	$1\frac{3}{8}$	$2\frac{1}{4}$					6	6	6	6	6	6	7	7	7	$2\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{7}{8}$	$1\frac{5}{8}$	$2\frac{3}{8}$					6	6	6	6	7	7	7	7	7	$2\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{7}{8}$
2	$1\frac{3}{4}$	$2\frac{1}{2}$						6	6	7	7	7	7	7	7	$2\frac{1}{2}$	$1\frac{3}{4}$	2
$2\frac{1}{8}$		$2\frac{5}{8}$							7	7	7	7	7			$2\frac{5}{8}$		$2\frac{1}{8}$
	$1\frac{7}{8}$	$2\frac{3}{4}$							7	7	7	7	7			$2\frac{3}{4}$	$1\frac{7}{8}$	
$2\frac{1}{4}$	2	$2\frac{7}{8}$								7	7					$2\frac{7}{8}$	2	$2\frac{1}{4}$
ROD ROUND	ROD SQUARE	ROD UPSET	PINS 1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	4	ROD UPSET	ROD SQUARE	ROD ROUND

Clevises above and to right of heavy zigzag line, may be used with forks straight. Clevises below and to left of same line, should have forks closed in until pin is not overstrained.

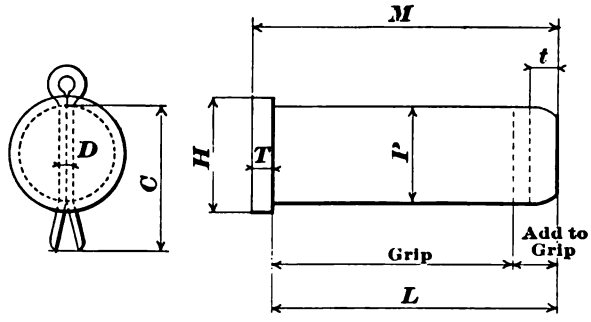
PINS WITH LOMAS NUTS.

All dimensions in inches.

DIAMETER OF PIN	PIN: SCREW DIAM.	PIN: SCREW LENGTH	PIN: ADD TO GRIP	STANDARD DIMENSIONS — 6 Threads per inch.	NUT: DIAM. OF ROUGH HOLE	NUT: SHORT DIAM. S	NUT: LONG DIAM. L	NUT: WEIGHT IN LBS.	DIAMETER OF PIN
2	1 1/2	1 1/2	1/4		1 5/16	3 1/4	3 3/4	2.5	2
2 1/4	1 1/2	1 1/2	1/4		1 5/16	3 1/4	3 3/4	2.5	2 1/4
2 1/2	2	1 1/2	1/4		1 13/16	3 3/4	4 5/16	2.5	2 1/2
2 3/4	2	1 1/2	1/4		1 13/16	3 3/4	4 5/16	2.5	2 3/4
3	2 1/2	1 1/2	1/4		2 5/16	4 1/2	5 5/16	3.0	3
3 1/4	2 1/2	1 1/2	1/4		2 5/16	4 1/2	5 5/16	3.0	3 1/4
3 1/2	2 1/2	1 1/2	1/4		2 5/16	4 1/2	5 5/16	3.0	3 1/2
3 3/4	3	1 7/8	1/2		2 13/16	5	5 3/4	5.5	3 3/4
4	3	1 7/8	1/2		2 13/16	5	5 3/4	5.5	4
4 1/4	3 1/2	1 7/8	1/2		3 5/16	5 3/4	6 5/8	7.0	4 1/4
4 1/2	3 1/2	1 7/8	1/2		3 5/16	5 3/4	6 5/8	7.0	4 1/2
4 3/4	3 1/2	1 7/8	1/2		3 5/16	5 3/4	6 5/8	7.0	4 3/4
5	4	1 7/8	1/2		3 13/16	6 1/2	7 1/2	8.5	5
5 1/4	4	1 7/8	1/2		3 13/16	6 1/2	7 1/2	8.5	5 1/4
5 1/2	4 1/2	1 7/8	1/2		4 5/16	7	8 1/8	11.0	5 1/2
5 3/4	4 1/2	1 7/8	1/2		4 5/16	7	8 1/8	11.0	5 3/4
6	4 1/2	1 7/8	1/2		4 5/16	7	8 1/8	11.0	6
6 1/4	5	2 3/8	3/4		4 13/16	7 3/4	8 15/16	12.0	6 1/4
6 1/2	5	2 3/8	3/4		4 13/16	7 3/4	8 15/16	12.0	6 1/2
6 3/4	5 1/2	2 3/8	3/4		5 5/16	8 1/4	9 1/2	13.5	6 3/4
7	5 1/2	2 3/8	3/4		5 5/16	8 1/4	9 1/2	13.5	7
7 1/4	5 1/2	2 3/8	3/4		5 5/16	8 1/4	9 1/2	13.5	7 1/4
7 1/2	5 1/2	2 3/8	3/4		5 5/16	8 1/4	9 1/2	13.5	7 1/2
7 3/4	6	2 3/8	3/4		5 13/16	9	10 3/8	17.0	7 3/4
8	6	2 3/8	3/4		5 13/16	9	10 3/8	17.0	8
8 1/4	6	2 3/8	3/4		5 13/16	9	10 3/8	17.0	8 1/4
8 1/2	6	2 3/8	3/4		5 13/16	9 1/2	10 7/8		8 1/2
8 3/4	6	2 3/8	3/4		5 13/16	10 1/2	12 1/8		8 3/4
9	6	2 3/8	3/4		5 13/16	10 1/2	12 1/8		9
9 1/4	6	2 3/8	3/4		5 13/16	10 1/2	12 1/8		9 1/4
9 1/2									9 1/2
9 3/4									9 3/4
10									10

NOTE:- To obtain grip "G" add $\frac{1}{16}$" for each bar, together with amount given in table.

COTTER PINS.

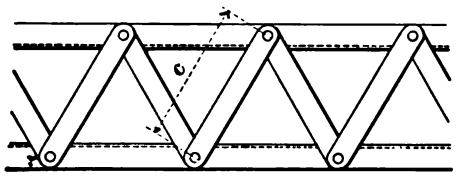


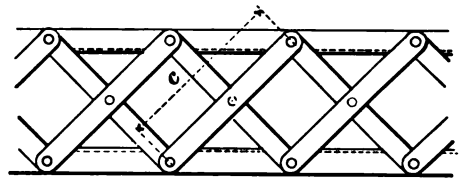
All dimensions in inches.

DIAMETER OF PIN	PIN		HEAD		COTTER		ADD TO GRIP		DIAMETER OF PIN
	DIAMETER OF PIN-HOLE	TAPER AT END	DIAMETER	THICKNESS	LENGTH	DIAMETER	FOR LENGTH OVER ALL	FOR LENGTH UNDER HEAD	
P		*t*	*H*	*T*	*C*	*D*	*M*	*L*	*P*
1	$1\frac{1}{32}$	$\frac{5}{16} \times \frac{1}{16}$	$1\frac{1}{4}$	$\frac{1}{4}$	$1\frac{3}{4}$	$\frac{1}{4}$	$\frac{7}{8}$	$\frac{5}{8}$	*1*
$1\frac{1}{4}$	$1\frac{9}{32}$	$\frac{5}{16} \times \frac{1}{16}$	$1\frac{1}{2}$	$\frac{1}{4}$	2	$\frac{1}{4}$	$\frac{7}{8}$	$\frac{5}{8}$	$1\frac{1}{4}$
$1\frac{1}{2}$	$1\frac{17}{32}$	$\frac{7}{16} \times \frac{3}{32}$	$1\frac{3}{4}$	$\frac{1}{4}$	$2\frac{1}{2}$	$\frac{5}{16}$	$1\frac{1}{8}$	$\frac{7}{8}$	$1\frac{1}{2}$
$1\frac{3}{4}$	$1\frac{25}{32}$	$\frac{7}{16} \times \frac{3}{32}$	2	$\frac{1}{4}$	$2\frac{3}{4}$	$\frac{5}{16}$	$1\frac{1}{8}$	$\frac{7}{8}$	$1\frac{3}{4}$
2	$2\frac{1}{32}$	$\frac{1}{2} \times \frac{1}{8}$	$2\frac{3}{8}$	$\frac{3}{8}$	3	$\frac{3}{8}$	$1\frac{3}{8}$	1	*2*
$2\frac{1}{4}$	$2\frac{9}{32}$	$\frac{1}{2} \times \frac{1}{8}$	$2\frac{3}{8}$	$\frac{3}{8}$	$3\frac{1}{4}$	$\frac{3}{8}$	$1\frac{3}{8}$	1	$2\frac{1}{4}$
$2\frac{1}{2}$	$2\frac{17}{32}$	$\frac{5}{8} \times \frac{5}{32}$	$2\frac{7}{8}$	$\frac{3}{8}$	$3\frac{3}{4}$	$\frac{7}{16}$	$1\frac{1}{2}$	$1\frac{1}{8}$	$2\frac{1}{2}$
$2\frac{3}{4}$	$2\frac{25}{32}$	$\frac{5}{8} \times \frac{5}{32}$	$3\frac{1}{8}$	$\frac{3}{8}$	4	$\frac{7}{16}$	$1\frac{1}{2}$	$1\frac{1}{8}$	$2\frac{3}{4}$
3	$3\frac{1}{32}$	$\frac{3}{4} \times \frac{3}{16}$	$3\frac{1}{2}$	$\frac{1}{2}$	5	$\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{3}{8}$	*3*
$3\frac{1}{4}$	$3\frac{9}{32}$	$\frac{3}{4} \times \frac{3}{16}$	$3\frac{3}{4}$	$\frac{1}{2}$	5	$\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{3}{8}$	$3\frac{1}{4}$
$3\frac{1}{2}$	$3\frac{17}{32}$	$\frac{7}{8} \times \frac{7}{32}$	4	$\frac{1}{2}$	6	$\frac{5}{8}$	$2\frac{1}{8}$	$1\frac{5}{8}$	$3\frac{1}{2}$
$3\frac{3}{4}$	$3\frac{25}{32}$	$\frac{7}{8} \times \frac{7}{32}$	$4\frac{1}{4}$	$\frac{1}{2}$	6	$\frac{5}{8}$	$2\frac{1}{8}$	$1\frac{5}{8}$	$3\frac{3}{4}$

NOTE:- Use pins with lomas nuts, in preference to cotter pins, whenever possible.

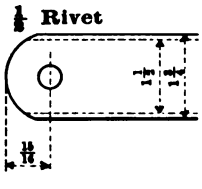
LACING

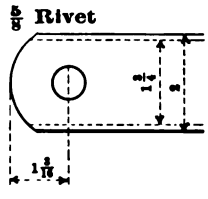


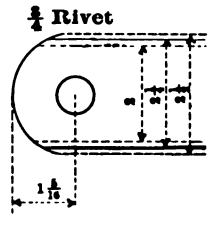


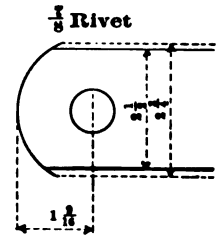
Maximum Distance c for given thickness of bar.

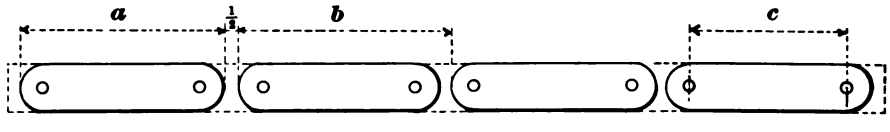
SINGLE LACING $t = \frac{c}{40}$		DOUBLE LACING $t = \frac{c}{60}$	
THICK. t	DISTANCE c	DISTANCE c	THICK. t
$\frac{1}{4}$	0 - 10	1 - 3	$\frac{1}{4}$
$\frac{5}{16}$	1 - $0\frac{1}{2}$	1 - $6\frac{3}{4}$	$\frac{5}{16}$
$\frac{3}{8}$	1 - 3	1 - $10\frac{1}{2}$	$\frac{3}{8}$
$\frac{7}{16}$	1 - $5\frac{1}{2}$	2 - $2\frac{1}{4}$	$\frac{7}{16}$
$\frac{1}{2}$	1 - 8	2 - 6	$\frac{1}{2}$
$\frac{9}{16}$	1 - $10\frac{1}{2}$	2 - $9\frac{3}{4}$	$\frac{9}{16}$
$\frac{5}{8}$	2 - 1	3 - $1\frac{1}{2}$	$\frac{5}{8}$







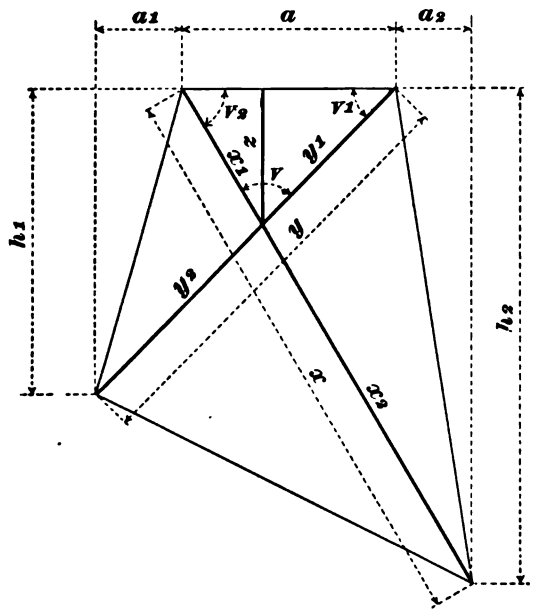




Distance to be added to C. C. length c.

WIDTH OF BAR	FINISHED LENGTH a				ORDERED LENGTH b				WIDTH OF BAR
	DIAM. OF RIVET				DIAM. OF RIVET				
	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	
$1\frac{1}{2}$	$1\frac{7}{8}$				$2\frac{3}{8}$				$1\frac{1}{2}$
$1\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{3}{8}$			$2\frac{3}{8}$	$2\frac{7}{8}$			$1\frac{3}{4}$
2		$2\frac{3}{8}$	$2\frac{7}{8}$			$2\frac{7}{8}$	$3\frac{1}{8}$		2
$2\frac{1}{4}$			$2\frac{7}{8}$				$3\frac{1}{8}$		$2\frac{1}{4}$
$2\frac{1}{2}$			$2\frac{7}{8}$	$3\frac{1}{8}$			$3\frac{1}{8}$	$3\frac{1}{8}$	$2\frac{1}{2}$
$2\frac{3}{4}$				$3\frac{1}{8}$				$3\frac{1}{8}$	$2\frac{3}{4}$

All Dimensions in Inches



$x = \sqrt{(a+a_2)^2+h_2^2}$

$y = \sqrt{(a+a_1)^2+h_2^2}$

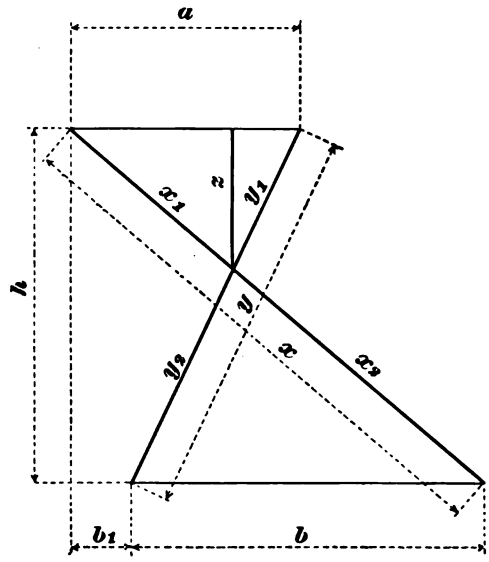
$\tan V_1 = \frac{h_1}{a+a_1}$

$\tan V_2 = \frac{h_2}{a+a_2}$

$x_1 = \frac{a(\sin V_1)}{\sin V}$

$y_1 = \frac{a(\sin V_2)}{\sin V}$

$z = \frac{h_2 x_1}{a} - y_1(\sin V_1)$



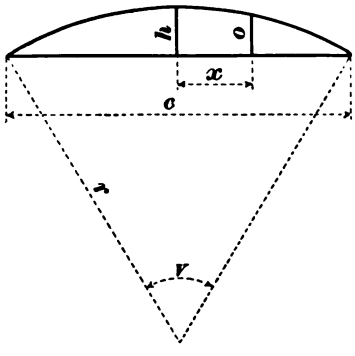
$x = \sqrt{(b+b_1)^2+h^2}$

$x_1 = \frac{ax}{a+b}$

$y = \sqrt{(a-b_1)^2+h^2}$

$y_1 = \frac{ay}{a+b}$

$z = \frac{ah}{a+b}$



$Arc. = .00873 \times diam. \times ang.\ V$

$c = 2\sqrt{r^2-(r-h)^2}$

$r = \frac{c^2}{8h} + \frac{h}{2}$

$h = r - \sqrt{r^2 - \frac{c^2}{4}} = \frac{c^2}{8r} + \frac{h^2}{2r}$

$o = \sqrt{r^2 - x^2} - (r-h)$

WOOD SCREWS, SPIKES AND NAILS.

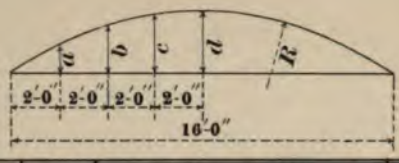
WOOD SCREWS		WROUGHT SPIKES NUMBER TO A KEG OF 150 LBS.						STANDARD STEEL WIRE NAILS						STEEL WIRE SPIKES		
										COMMON		FINISHING				
NO.	DIAM.	LENGTH IN INCHES	¼ INCH NO.	5/16 INCH NO.	⅜ INCH NO.	7/16 INCH NO.	½ INCH NO.	SIZE	LENGTH INCHES	DIAM. INCHES	NO. PER POUND	DIAM. INCHES	NO. PER POUND	LENGTH INCHES	DIAM. INCHES	NO. PER POUND
0	.056	3	2250					2d	1	.0524	1060	.0453	1558	3	.1620	41
1	.069	3½	1890	1208				3d	1¼	.0588	640	.0508	913	3½	.1819	30
2	.082	4	1650	1135				4d	1½	.0720	380	.0508	761	4	.2043	23
3	.096	4½	1464	1064				5d	1¾	.0764	275	.0571	500	4½	.2294	17
4	.109	5	1380	930	742			6d	2	.0808	210	.0641	350	5	.2576	13
5	.122	6	1292	868	570			7d	2¼	.0858	160	.0641	315	5½	.2893	11
6	.135	7	1161	662	482	445	306	8d	2½	.0935	115	.0720	214	6	.2893	10
7	.149	8		635	455	384	256	9d	2¾	.0963	93	.0720	195	6½	.2249	7⅓
8	.162	9		573	424	300	240	10d	3	.1082	77	.0808	137	7	.2249	7
9	.175	10			391	270	222	12d	3¼	.1144	60	.0808	127	8	.3648	5
10	.188	11				249	203	16d	3½	.1285	48	.0907	90	9	.3648	4½
11	.201	12				236	180	20d	4	.1620	31	.1019	62			
12	.215							30d	4½	.1819	22					
13	.228							40d	5	.2043	17					
14	.241							50d	5½	.2294	13					
15	.255							60d	6	.2576	11					
16	.268															
17	.281															
18	.293															
19	.308															
20	.321															
21	.334															
22	.347															
23	.361															
24	.374															
25	.387															
26	.401															
27	.414															
28	.427															
29	.440															
30	.453															

WROUGHT IRON TUBES

ORDINARY GAS OR WATER PIPE								HYDRAULIC TUBING.			
								EXTRA		DOUBLE EXTRA	
NOMINAL DIAM.	OUTSIDE DIAM.	THICKNESS	INSIDE DIAM.	INTERNAL AREA	EXTERNAL AREA	WEIGHT PER. FOOT	THREADS PER. INCH	THICKNESS	INSIDE DIAM.	THICKNESS	INSIDE DIAM.
$\frac{1}{8}$	.40	.07	.27	.06	.13	.24	27	.10	.20		
$\frac{1}{4}$	.54	.09	.36	.10	.23	.42	18	.12	.29		
$\frac{3}{8}$	.67	.09	.49	.19	.36	.56	18	.13	.42	.22	.23
$\frac{1}{2}$	.84	.11	.62	.30	.55	.84	14	.15	.54	.29	.24
$\frac{3}{4}$	1.05	.11	.82	.53	.87	1.12	14	.16	.73	.31	.42
1	1.31	.13	1.05	.86	1.36	1.67	$11\frac{1}{2}$	.18	.95	.36	.58
$1\frac{1}{4}$	1.66	.14	1.38	1.49	2.15	2.24	$11\frac{1}{2}$	.19	1.27	.38	.88
$1\frac{1}{2}$	1.90	.15	1.61	2.03	2.84	2.68	$11\frac{1}{2}$	.20	1.49	.40	1.08
2	2.37	.15	2.07	3.35	4.48	3.61	$11\frac{1}{2}$	.22	1.93	.44	1.49
$2\frac{1}{2}$	2.87	.20	2.47	4.78	6.49	5.74	8	.28	2.31	.56	1.75
3	3.50	.22	3.07	7.38	9.62	7.54	8	.30	2.89	.60	2.28
$3\frac{1}{2}$	4.00	.23	3.55	9.89	12.57	9.00	8	.32	3.35	.64	2.71
4	4.50	.24	4.03	12.73	15.96	10.66	8	.34	3.81	.68	3.13
$4\frac{1}{2}$	5.00	.25	4.51	15.96	19.64	12.34	8	.35	4.25	.72	3.56
5	5.56	.26	5.05	19.99	24.30	14.50	8	.37	4.81	.75	4.06
6	6.63	.28	6.07	28.88	34.47	18.76	8	.44	5.75	.87	4.87
7	7.63	.30	7.02	38.73	45.66	23.27	8	.50	6.62	.84	6.06
8	8.63	.32	7.98	50.03	58.43	28.18	8	.56	7.50	.87	6.87
9	9.63	.34	8.94	62.73	73.72	33.70	8				
10	10.75	.36	10.02	78.84	90.76	40.06	8				
12	12.75	.38	12.00	113.09		49.00	8				
13	14.00	.38	13.25			53.92	8				
14	15.00	.38	14.25			57.89	8				

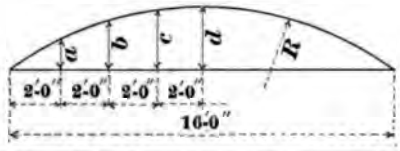
Note: Above 15 inches the outside diameters are the nominal size.
All dimensions given in inches, all weights in pounds.

ORDINATES
for 16 foot chords



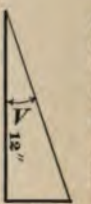
RADIUS IN INCHES	ORDINATES FOR 16'-0" TEMPLET				RADIUS IN INCHES	ORDINATES FOR 16'-0" TEMPLET				RADIUS IN INCHES	ORDINATES FOR 16'-0" TEMPLET			
	a	*b*	*c*	*d*		*a*	*b*	*c*	*d*		*a.*	*b*	*c*	*d*
200	11 5/32	18 23/32	23 3/32	24 9/16	**290**	7 9/32	12 11/32	15 11/32	16 11/32	**520**	3 15/16	6 23/32	8 13/32	8 15/16
02	11	18 1/2	22 27/32	24 9/32	**93**	7 7/32	12 7/32	15 5/16	16 5/16	**30**	3 7/8	6 19/32	8 1/4	8 29/32
04	10 7/8	18 9/32	22 19/32	24	**96**	7 1/8	12 3/32	15 1/32	16	**40**	3 25/32	6 1/2	8 3/32	8 7/8
06	10 3/4	18 1/16	22 11/32	23 3/4	**300**	7 1/32	11 15/16	14 15/16	15 29/32	**550**	3 23/32	6 11/32	7 29/32	8 7/16
08	10 5/8	17 7/8	22 3/32	23 15/32	**05**	6 7/8	11 23/32	14 9/16	15 1/2	**60**	3 21/32	6 7/32	7 28/32	8 9/32
210	10 1/2	17 21/32	21 7/8	23 7/32	**10**	6 3/4	11 1/2	14 9/32	15 7/32	**70**	3 19/32	6 1/8	7 31/32	8 5/32
12	10 3/8	17 15/32	21 5/8	23	**15**	6 21/32	11 5/16	14 1/16	15	**80**	3 17/32	6 1/32	7 1/2	8
14	10 9/32	17 5/16	21 13/32	22 3/4	**20**	6 9/16	11 1/8	13 27/32	14 3/4	**90**	3 7/16	5 29/32	7 5/8	7 7/8
16	10 5/32	17 1/8	21 3/16	22 1/2	**25**	6 7/16	10 15/16	13 5/8	14 1/2	**600**	3 13/32	5 15/16	7 1/4	7 23/32
18	10 1/16	16 15/16	20 31/32	22 9/32	**30**	6 11/32	10 25/32	13 13/32	14 9/32	**10**	3 11/32	5 25/32	7 1/8	7 19/32
220	9 15/16	16 3/4	20 3/4	22 1/16	**35**	6 7/32	10 19/32	13 3/16	14 1/16	**20**	3 9/32	5 5/8	7 1/32	7 1/2
22	9 27/32	16 19/32	20 17/32	21 27/32	**40**	6 5/32	10 7/16	13	13 27/32	**30**	3 1/4	5 17/32	6	7 3/8
24	9 3/4	16 13/32	20 11/32	21 5/8	**45**	6 1/32	10 9/32	12 13/16	13 5/8	**40**	3 3/16	5 7/16	6 29/32	7 1/4
26	9 5/8	16 1/4	20 1/4	21 13/32	**350**	5 15/16	10 1/8	12 19/32	13 7/16	**650**	3 1/8	5 11/32	6 11/16	7 1/8
28	9 17/32	16 3/32	19 15/16	21 7/32	**55**	5 27/32	9 31/32	12 7/16	13 7/32	**60**	3 3/32	5 9/32	6 25/32	7 1/32
230	9 7/16	15 15/16	19 25/32	21	**60**	5 3/4	9 15/16	12 1/4	13 1/32	**70**	3 1/32	5 3/16	6 1/2	6 29/32
32	9 11/32	15 25/32	19 9/16	20 15/16	**65**	5 11/16	9 11/16	12 1/16	12 7/8	**80**	3	5 1/8	6 13/32	6 15/16
34	9 9/32	15 5/8	19 3/8	20 25/32	**70**	5 5/8	9 9/16	11 29/32	12 11/16	**90**	2 31/32	5 1/16	6 5/16	6 23/32
36	9 5/32	15 19/32	19 3/16	20 19/32	**75**	5 17/32	9 13/32	11 3/4	12 1/2	**700**	2 29/32	5	6 7/32	6 5/8
38	9 1/16	15 11/32	19 1/32	20 7/32	**80**	5 7/16	9 9/32	11 9/16	12 5/16	**10**	2 27/32	4 7/8	6 3/32	6 1/2
240	8 31/32	15 5/16	18 27/32	20 1/32	**85**	5 3/8	9 5/32	11 13/32	12 5/32	**20**	2 13/16	4 13/16	6 1/32	6 7/16
43	8 7/8	15	18 13/32	19 25/32	**90**	5 5/16	9 1/32	11 5/32	12	**30**	2 25/32	4 3/4	5 15/16	6 11/32
46	8 3/4	14 29/32	18 11/32	19 1/2	**95**	5 1/4	8 15/16	11 1/8	11 27/32	**40**	2 3/4	4 11/16	5 7/8	6 1/4
250	8 19/32	14 17/32	18 1/32	19 5/16	**400**	5 5/32	8 13/16	10 31/32	11 11/16	**750**	2 23/32	4 21/32	5 25/32	6 3/16
53	8 15/32	14 11/32	17 29/32	18 15/16	**10**	5 1/32	8 19/32	10 23/32	11 13/32	**60**	2 21/32	4 5/16	5 23/32	6 3/32
56	8 11/32	14 5/32	17 9/16	18 11/16	**20**	4 29/32	8 5/8	10 7/16	11 1/8	**70**	2 5/8	4 1/2	5 5/8	6
260	8 7/32	13 29/32	17 3/32	18 3/8	**30**	4 25/32	8 3/16	10 3/16	10 7/8	**80**	2 19/32	4 7/16	5 9/16	5 15/16
63	8 1/8	13 3/4	17 1/16	18 5/32	**40**	4 21/32	7 31/32	9 15/16	10 19/32	**90**	2 19/32	4 13/32	5 1/2	5 7/8
66	8	13 9/16	16 27/32	17 23/32	**450**	4 9/16	7 15/16	9 23/32	10 5/8	**800**	2 17/32	4 11/32	5 7/16	5 25/32
270	7 7/8	13 11/32	16 5/8	17 21/32	**60**	4 15/32	7 5/8	9 1/2	10 1/8	**10**	2 1/2	4 9/32	5 11/32	5 23/32
73	7 25/32	13 5/16	16 3/8	17 7/16	**70**	4 3/8	7 15/32	9 3/16	9 29/32	**20**	2 15/32	4 1/4	5 9/32	5 21/32
76	7 11/16	13 1/32	16 5/16	17 1/4	**80**	4 1/4	7 9/32	9 3/32	9 11/16	**30**	2 15/32	4 5/16	5 1/4	5 19/32
280	7 9/16	12 27/32	15 15/16	16 31/32	**90**	4 5/16	7 3/32	8 29/32	9 1/2	**40**	2 13/32	4 1/8	5 5/32	5 1/2
83	7 15/32	12 11/16	15 25/32	16 25/32	**500**	4 5/32	7	8 23/32	9 5/16	**850**	2 3/8	4 3/32	5 3/32	5 7/16
86	7 17/32	12 17/32	15 19/32	16 13/32	**10**	4 1/32	6 7/8	8 5/16	9 1/8	**60**	2 5/16	4 1/32	5 1/16	5 3/8

ORDINATES
for 16 foot chords



RADIUS IN INCHES	ORDINATES FOR 16'-0" TEMPLET				RADIUS IN INCHES	ORDINATES FOR 16'-0" TEMPLET				RADIUS IN INCHES	ORDINATES FOR 16'-0" TEMPLET			
	a	*b*	*c*	*d*		*a*	*b*	*c*	*d*		*a*	*b*	*c*	*d*
870	2 11/32	4	5	5 5/16	**1460**	1 3/8	2 3/8	2 23/32	3 5/32	**2900**	11/16	1 3/16	1 15/32	1 9/16
80	2 5/16	3 15/16	4 15/16	5 1/4	**90**	1 3/8	2 5/16	2 29/32	3 3/32	**50**	11/16	1 5/32	1 7/16	1 9/16
90	2 5/32	3 29/32	4 7/8	5 5/16	**1520**	1 11/32	2 9/32	2 27/32	3 1/32	**3000**	11/16	1 5/32	1 7/16	1 17/32
900	2 1/4	3 27/32	4 13/16	5 1/8	**50**	1 5/16	2 7/32	2 26/32	2 31/32	**3100**	21/32	1 1/8	1 13/32	1 1/2
10	2 7/32	3 13/16	4 3/4	5 1/16	**80**	1 1/4	2 3/16	2 23/32	2 29/32	**3200**	5/8	1 3/32	1 11/32	1 7/16
20	2 3/16	3 25/32	4 23/32	5 1/32	**1620**	1 7/32	2 5/32	2 11/16	2 27/32	**3300**	19/32	1 1/16	1 5/16	1 13/32
30	2 5/16	3 3/4	4 21/32	4 31/32	**50**	1 7/32	2 5/32	2 5/8	2 25/32	**3400**	9/16	1 1/32	1 1/4	1 11/32
40	2 5/32	3 23/32	4 5/8	4 15/16	**80**	1 3/16	2 1/16	2 5/16	2 3/4	**3500**	9/16	1	1 1/4	1 5/16
950	2 5/32	3 11/16	4 19/32	4 7/8	**1710**	1 3/16	2 1/32	2 17/32	2 11/16	**3600**	17/32	31/32	1 7/32	1 9/32
60	2 1/8	3 5/8	4 17/32	4 27/32	**40**	1 5/32	2	2 15/32	2 21/32	**3700**	17/32	15/16	1 3/16	1 1/4
70	2 1/8	3 5/8	4 1/2	4 25/32	**70**	1 1/8	1 15/16	2 7/16	2 19/32	**3800**	17/32	29/32	1 5/32	1 7/32
80		3 9/16	4 7/16	4 23/32	**1800**	1 1/8	1 29/32	2 13/32	2 9/16	**3900**	17/32	29/32	1 1/8	1 3/16
90		3 1/2	4 3/8	4 21/32	**30**	1 5/32	1 7/8	2 11/32	2 1/2	**4000**	1/2	7/8	1 3/32	1 5/32
1000	2 1/32	3 15/32	4 11/32	4 5/8	**60**	1 3/32	1 27/32	2 5/16	2 15/32	**4100**	1/2	27/32	1 1/16	1 1/8
20	2	3 13/32	4 1/4	4 17/32	**90**	1 1/16	1 27/32	2 9/32	2 7/16	**4200**	15/32	13/16	1 1/32	1 3/32
40	1 15/16	3 11/32	4 5/32	4 7/16	**1920**	1 1/16	1 13/16	2 1/4	2 13/32	**4300**	15/32	13/16	1	1 1/16
60	1 29/32	3 5/32	4 3/32	4 3/8	**50**	1 1/16	1 25/32	2 1/4	2 3/8	**4400**	15/32	13/16	31/32	1 1/16
80	1 29/32	3 7/32	4 1/32	4 9/32	**2000**	1	1 25/32	2 5/32	2 5/16	**4600**	7/16	25/32	15/16	1
1100	1 27/32	3 5/32	3 15/16	4 7/32	**50**	1	1 11/16	2 1/8	2 1/4	**4800**	7/16	23/32	29/32	31/32
20	1 13/16	3 3/32	3 7/8	4 1/8	**2100**	31/32	1 21/32	2 1/16	2 7/32	**5000**	13/32	23/32	7/8	15/16
40	1 25/32	3 1/32	3 13/16	4 1/16	**50**	31/32	1 21/32	2 1/32	2 5/32	**5200**	13/32	21/32	27/32	29/32
60	1 3/4	2 31/32	3 23/32	3 31/32	**2200**	15/16	1 5/32	2	2 1/16	**5400**	3/8	21/32	13/16	7/8
80	1 23/32	2 15/16	3 21/32	3 29/32	**50**	29/32	1 5/16	1 15/16	2 1/16	**5600**	3/8	21/32	13/16	27/32
1200	1 11/16	2 7/8	3 19/32	3 27/32	**2300**	29/32	1 17/32	1 29/32	2 1/32	**5800**	3/8	19/32	3/4	13/16
20	1 21/32	2 27/32	3 9/16	3 25/32	**50**	7/8	1 1/2	1 27/32	1 31/32	**6000**	11/32	19/32	3/4	25/32
40	1 5/8	2 13/16	3 1/2	3 23/32	**2400**	27/32	1 7/16	1 13/16	1 15/16	**6150**	11/32	9/16	23/32	3/4
60	1 19/32	2 3/4	3 7/16	3 21/32	**50**	13/16	1 13/32	1 3/4	1 7/8	**6350**	5/16	9/16	11/16	3/4
80	1 9/16	2 23/32	3 3/8	3 19/32	**2500**	13/16	1 3/8	1 23/32	1 27/32	**6500**	5/16	17/32	21/32	23/32
1300	1 17/32	2 21/32	3 5/16	3 17/32	**50**	25/32	1 11/32	1 11/16	1 13/16	**7000**	5/32	1/2	5/8	21/32
20	1 1/2	2 19/32	3 1/4	3 15/32	**2600**	25/32	1 11/32	1 21/32	1 25/32	**7500**	9/32	15/32	19/32	5/8
40	1 15/32	2 9/16	3 5/16	3 13/32	**50**	3/4	1 5/16	1 5/8	1 3/4	**8000**	1/4	7/16	17/32	9/16
60	1 13/32	2 17/32	3 5/32	3 3/8	**2700**	3/4	1 9/32	1 19/32	1 23/32	**8500**	1/4	13/32	1/2	9/16
80	1 7/16	2 1/2	3 1/8	3 11/32	**50**	3/4	1 1/4	1 9/16	1 11/16	**9000**	7/32	3/8	15/32	1/2
1400	1 7/16	2 15/32	3 3/32	3 5/16	**2800**	23/32	1 7/32	1 17/32	1 21/32	**10000**	7/64	11/32	7/16	15/32
30	1 13/32	2 13/32	3 1/32	3 7/32	**50**	23/32	1 7/32	1 1/2	1 5/8					

Table of Bevels



DIST. a	0" ANGLE V. DEG.	0" ANGLE V. MIN.	1" ANGLE V. DEG.	1" ANGLE V. MIN.	2" ANGLE V. DEG.	2" ANGLE V. MIN.	3" ANGLE V. DEG.	3" ANGLE V. MIN.	4" ANGLE V. DEG.	4" ANGLE V. MIN.	5" ANGLE V. DEG.	5" ANGLE V. MIN.	6" ANGLE V. DEG.	6" ANGLE V. MIN.	7" ANGLE V. DEG.	7" ANGLE V. MIN.	8" ANGLE V. DEG.	8" ANGLE V. MIN.	9" ANGLE V. DEG.	9" ANGLE V. MIN.	10" ANGLE V. DEG.	10" ANGLE V. MIN.	11" ANGLE V. DEG.	11" ANGLE V. MIN.	DIST. a
0			4	45	9	28	14	03	18	26	22	37	26	34	30	15	33	42	36	52	39	48	42	31	0
1/32	0	09	4	55	9	37	14	11	18	35	22	45	26	41	30	22	33	48	36	58	39	54	42	36	1/32
1/16	0	18	5	04	9	45	14	19	18	43	22	53	26	49	30	29	33	54	37	04	39	59	42	40	1/16
3/32	0	27	5	12	9	54	14	28	18	50	23	00	26	55	30	35	34	00	37	10	40	05	42	45	3/32
1/8	0	36	5	20	10	02	14	36	18	59	23	08	27	02	30	42	34	07	37	15	40	10	42	50	1/8
5/32	0	45	5	31	10	12	14	45	19	07	23	15	27	10	30	49	34	13	37	20	40	15	42	55	5/32
3/16	0	54	5	39	10	20	14	53	19	15	23	23	27	17	30	56	34	18	37	26	40	20	43	00	3/16
7/32	1	02	5	48	10	29	15	01	19	23	23	30	27	24	31	02	34	24	37	32	40	25	43	05	7/32
1/4	1	11	5	57	10	38	15	09	19	30	23	38	27	30	31	09	34	30	37	38	40	30	43	10	1/4
9/32	1	20	6	06	10	46	15	18	19	38	23	46	27	38	31	15	34	37	37	43	40	35	43	14	9/32
5/16	1	30	6	15	10	55	15	26	19	46	23	53	27	45	31	22	34	43	37	49	40	40	43	19	5/16
11/32	1	38	6	24	11	04	15	34	19	54	24	00	27	52	31	28	34	49	37	55	40	46	43	24	11/32
3/8	1	47	6	32	11	12	15	42	20	02	24	08	27	58	31	35	34	55	38	00	40	51	43	28	3/8
13/32	1	57	6	41	11	20	15	51	20	10	24	16	28	06	31	41	35	00	38	05	40	56	43	33	13/32
7/16	2	06	6	50	11	29	16	00	20	18	24	23	28	13	31	48	35	07	38	11	41	01	43	38	7/16
15/32	2	15	6	59	11	38	16	08	20	26	24	30	28	20	31	54	35	13	38	16	41	06	43	42	15/32
1/2	2	24	7	08	11	46	16	16	20	34	24	38	28	27	32	00	35	19	38	22	41	11	43	47	1/2
17/32	2	33	7	16	11	55	16	24	20	41	24	45	28	34	32	07	35	25	38	27	41	16	43	51	17/32
9/16	2	41	7	25	12	03	16	32	20	49	24	53	28	41	32	14	35	31	38	33	41	21	43	56	9/16
19/32	2	50	7	34	12	12	16	40	20	57	25	00	28	48	32	20	35	36	38	39	41	26	44	01	19/32
5/8	2	59	7	43	12	20	16	49	21	05	25	08	28	55	32	26	35	42	38	44	41	31	44	06	5/8
21/32	3	08	7	52	12	30	16	57	21	12	25	15	29	02	32	32	35	48	38	50	41	37	44	10	21/32
11/16	3	17	8	00	12	38	17	05	21	20	25	22	29	08	32	38	35	55	38	55	41	41	44	15	11/16
23/32	3	26	8	09	12	46	17	13	21	28	25	29	29	15	32	45	36	00	39	00	41	46	44	20	23/32
3/4	3	35	8	18	12	55	17	21	21	35	25	37	29	22	32	51	36	06	39	06	41	51	44	24	3/4
25/32	3	44	8	27	13	04	17	30	21	44	25	44	29	28	32	58	36	12	39	11	41	56	44	29	25/32
13/16	3	52	8	35	13	12	17	38	21	52	25	51	29	35	33	04	36	17	39	16	42	01	44	33	13/16
27/32	4	01	8	44	13	20	17	46	21	59	25	58	29	42	33	10	36	24	39	21	42	06	44	38	27/32
7/8	4	10	8	53	13	29	17	54	22	07	26	05	29	48	33	17	36	30	39	27	42	11	44	42	7/8
29/32	4	20	9	02	13	37	18	02	22	15	26	13	29	55	33	23	36	35	39	32	42	16	44	47	29/32

NATURAL TANGENTS.

DEGREES	0′	5′	10′	15′	20′	25′	30′	35′	40′	45′	50′	55′	60′	DEGREES
0	.0000	.0015	.0029	.0044	.0058	.0073	.0087	.0102	.0116	.0131	.0146	.0160	.0175	0
1	.0175	.0189	.0204	.0218	.0233	.0247	.0262	.0276	.0291	.0306	.0320	.0335	.0349	1
2	.0349	.0364	.0378	.0393	.0407	.0422	.0437	.0451	.0466	.0480	.0495	.0509	.0524	2
3	.0524	.0539	.0553	.0568	.0582	.0597	.0612	.0626	.0641	.0655	.0670	.0685	.0699	3
4	.0699	.0714	.0729	.0743	.0758	.0772	.0787	.0802	.0816	.0831	.0846	.0860	.0875	4
5	.0875	.0890	.0904	.0919	.0934	.0948	.0963	.0978	.0992	.1007	.1022	.1036	.1051	5
6	.1051	.1066	.1080	.1095	.1110	.1125	.1139	.1154	.1169	.1184	.1198	.1213	.1228	6
7	.1228	.1243	.1257	.1272	.1287	.1302	.1317	.1331	.1346	.1361	.1376	.1391	.1405	7
8	.1405	.1420	.1435	.1450	.1465	.1480	.1495	.1509	.1524	.1539	.1554	.1569	.1584	8
9	.1584	.1599	.1614	.1629	.1644	.1658	.1673	.1688	.1703	.1718	.1733	.1748	.1763	9
10	.1763	.1778	.1793	.1808	.1823	.1838	.1853	.1868	.1883	.1899	.1914	.1929	.1944	10
11	.1944	.1959	.1974	.1989	.2004	.2019	.2035	.2050	.2065	.2080	.2095	.2110	.2126	11
12	.2126	.2141	.2156	.2171	.2186	.2202	.2217	.2232	.2247	.2263	.2278	.2293	.2309	12
13	.2309	.2324	.2339	.2355	.2370	.2385	.2401	.2416	.2432	.2447	.2462	.2478	.2493	13
14	.2493	.2509	.2524	.2540	.2555	.2571	.2586	.2602	.2617	.2633	.2648	.2664	.2679	14
15	.2679	.2695	.2711	.2726	.2742	.2758	.2773	.2789	.2805	.2820	.2836	.2852	.2867	15
16	.2867	.2883	.2899	.2915	.2931	.2946	.2962	.2978	.2994	.3010	.3026	.3041	.3057	16
17	.3057	.3073	.3089	.3105	.3121	.3137	.3153	.3169	.3185	.3201	.3217	.3233	.3249	17
18	.3249	.3265	.3281	.3298	.3314	.3330	.3346	.3362	.3378	.3395	.3411	.3427	.3443	18
19	.3443	.3460	.3476	.3492	.3508	.3525	.3541	.3558	.3574	.3590	.3607	.3623	.3640	19
20	.3640	.3656	.3673	.3689	.3706	.3722	.3739	.3755	.3772	.3789	.3805	.3822	.3839	20
21	.3839	.3855	.3872	.3889	.3906	.3922	.3939	.3956	.3973	.3990	.4006	.4023	.4040	21
22	.4040	.4057	.4074	.4091	.4108	.4125	.4142	.4159	.4176	.4193	.4210	.4228	.4245	22
23	.4245	.4262	.4279	.4296	.4314	.4331	.4348	.4365	.4383	.4400	.4417	.4435	.4452	23
24	.4452	.4470	.4487	.4505	.4522	.4540	.4557	.4575	.4592	.4610	.4628	.4645	.4663	24
25	.4663	.4681	.4699	.4716	.4734	.4752	.4770	.4788	.4806	.4823	.4841	.4859	.4877	25
26	.4877	.4895	.4913	.4931	.4950	.4968	.4986	.5004	.5022	.5040	.5059	.5077	.5095	26
27	.5095	.5114	.5132	.5150	.5169	.5187	.5206	.5224	.5243	.5261	.5280	.5298	.5317	27
28	.5317	.5336	.5354	.5373	.5392	.5411	.5430	.5448	.5467	.5486	.5505	.5524	.5543	28
29	.5543	.5562	.5581	.5600	.5619	.5639	.5658	.5677	.5696	.5715	.5735	.5754	.5774	29
30	.5774	.5793	.5812	.5832	.5851	.5871	.5890	.5910	.5930	.5949	.5969	.5989	.6009	30
31	.6009	.6028	.6048	.6068	.6088	.6108	.6128	.6148	.6168	.6188	.6208	.6228	.6249	31
32	.6249	.6269	.6289	.6310	.6330	.6350	.6371	.6391	.6412	.6432	.6453	.6473	.6494	32
33	.6494	.6515	.6536	.6556	.6577	.6598	.6619	.6640	.6661	.6682	.6703	.6724	.6745	33
34	.6745	.6766	.6787	.6809	.6830	.6851	.6873	.6894	.6916	.6937	.6959	.6980	.7002	34
35	.7002	.7024	.7046	.7067	.7089	.7111	.7133	.7155	.7177	.7199	.7221	.7243	.7265	35
36	.7265	.7288	.7310	.7332	.7355	.7377	.7400	.7422	.7445	.7467	.7490	.7513	.7536	36
37	.7536	.7558	.7581	.7604	.7627	.7650	.7673	.7696	.7720	.7743	.7766	.7789	.7813	37
38	.7813	.7836	.7860	.7883	.7907	.7931	.7954	.7978	.8002	.8026	.8050	.8074	.8098	38
39	.8098	.8122	.8146	.8170	.8195	.8219	.8243	.8268	.8292	.8317	.8342	.8366	.8391	39
40	.8391	.8416	.8441	.8466	.8491	.8516	.8541	.8566	.8591	.8617	.8642	.8667	.8693	40
41	.8693	.8718	.8744	.8770	.8796	.8821	.8847	.8873	.8899	.8925	.8952	.8978	.9004	41
42	.9004	.9030	.9057	.9083	.9110	.9137	.9163	.9190	.9217	.9244	.9271	.9298	.9325	42
43	.9325	.9352	.9380	.9407	.9435	.9462	.9490	.9517	.9545	.9573	.9601	.9629	.9657	43
44	.9657	.9685	.9713	.9742	.9770	.9798	.9827	.9856	.9884	.9913	.9942	.9971	1.0000	44
DEGREES	0′	5′	10′	15′	20′	25′	30′	35′	40′	45′	50′	55′	60′	DEGREES

MULTIPLICATION TABLE

For Rivetspacing

SPACES	PITCH IN INCHES														SPACES
	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	
1																1
2	- 2 1/4	- 2 1/2	- 2 3/4	- 3	- 3 1/4	- 3 1/2	- 3 3/4	- 4	- 4 1/4	- 4 1/2	- 4 3/4	- 5	- 5 1/4	- 5 1/2	- 5 3/4	2
3	- 3 3/8	- 3 3/4	- 4 1/8	- 4 1/2	- 4 7/8	- 5 1/4	- 5 5/8	- 6	- 6 3/8	- 6 3/4	- 7 1/8	- 7 1/2	- 7 7/8	- 8 1/4	- 8 5/8	3
4	- 4 1/2	- 5	- 5 1/2	- 6	- 6 1/2	- 7	- 7 1/2	- 8	- 8 1/2	- 9	- 9 1/2	-10	-10 1/2	-11	-11 1/2	4
5	- 5 5/8	- 6 1/4	- 6 7/8	- 7 1/2	- 8 1/8	- 8 3/4	- 9 3/8	-10	-10 5/8	-11 1/4	-11 7/8	1- 0 1/2	1- 1 1/8	1- 1 3/4	1- 2 3/8	5
6	- 6 3/4	- 7 1/2	- 8 1/4	- 9	- 9 3/4	-10 1/2	-11 1/4	1- 0	1- 0 3/4	1- 1 1/2	1- 2 1/4	1- 3	1- 3 3/4	1- 4 1/2	1- 5 1/4	6
7	- 7 7/8	- 8 3/4	- 9 5/8	-10 1/2	-11 3/8	1- 0 1/4	1- 1 1/8	1- 2	1- 2 7/8	1- 3 3/4	1- 4 5/8	1- 5 1/2	1- 6 3/8	1- 7 1/4	1- 8 1/8	7
8	- 9	-10	-11	1- 0	1- 1	1- 2	1- 3	1- 4	1- 5	1- 6	1- 7	1- 8	1- 9	1-10	1-11	8
9	-10 1/8	-11 1/4	1- 0 3/8	1- 1 1/2	1- 2 5/8	1- 3 3/4	1- 4 7/8	1- 6	1- 7 1/8	1- 8 1/4	1- 9 3/8	1-10 1/2	1-11 5/8	2- 0 3/4	2- 1 7/8	9
10	-11 1/4	1 0 1/2	1- 1 7/8	1- 3	1- 4 1/2	1- 5 1/2	1- 6 3/4	1- 8	1- 9 1/4	1-10 1/2	1-11 3/4	2- 1	2- 2 1/4	2- 3 1/2	2- 4 3/4	10
11	1- 0 3/8	1- 1 3/4	1- 3 1/8	1- 4 1/2	1- 5 7/8	1- 7 1/4	1- 8 5/8	1-10	1-11 3/8	2- 0 3/4	2- 2 1/8	2- 3 1/2	2- 4 7/8	2- 6 1/4	2- 7 5/8	11
12	1- 1 1/2	1- 3	1- 4 1/2	1- 6	1- 7 1/2	1- 9	1-10 1/2	2- 0	2- 1 1/2	2- 3	2- 4 1/2	2- 6	2- 7 1/2	2- 9	2-10 1/2	12
13	1- 2 5/8	1- 4 1/4	1- 5 7/8	1- 7 1/2	1- 9 1/8	1-10 3/4	2- 0 3/8	2- 2	2- 3 5/8	2- 5 1/4	2- 6 7/8	2- 8 1/2	2-10 1/8	2-11 3/4	3- 1 3/8	13
14	1- 3 3/4	1- 5 1/2	1- 7 1/4	1- 9	1-10 3/4	2- 0 1/2	2- 2 1/4	2- 4	2- 5 3/4	2- 7 1/2	2- 9 1/4	2-11	3- 0 3/4	3- 2 1/2	3- 4 1/4	14
15	1- 4 7/8	1- 6 3/4	1- 8 5/8	1-10 1/2	2- 0 3/8	2- 2 1/4	2- 4 1/8	2- 6	2- 7 7/8	2- 9 3/4	2-11 5/8	3- 1 1/2	3- 3 3/8	3- 5 1/4	3- 7 1/8	15
16	1- 6	1- 8	1-10	2- 0	2- 2	2- 4	2- 6	2- 8	2-10	3- 0	3- 2	3- 4	3- 6	3- 8	3-10	16
17	1- 7 1/8	1- 9 1/4	1-11 3/8	2- 1 1/2	2- 3 5/8	2- 5 3/4	2- 7 7/8	2-10	3- 0 1/8	3- 2 1/4	3- 4 3/8	3- 6 1/2	3- 8 5/8	3-10 3/4	4- 0 7/8	17
18	1- 8 1/4	1-10 1/2	2- 0 3/4	2- 3	2- 5 1/4	2- 7 1/2	2- 9 3/4	3- 0	3- 2 1/4	3- 4 1/2	3- 6 3/4	3- 9	3-11 1/4	4- 1 1/2	4- 3 3/4	18
19	1- 9 3/8	1-11 3/4	2- 2 1/8	2- 4 1/2	2- 6 7/8	2- 9 1/4	2-11 5/8	3- 2	3- 4 3/8	3- 6 3/4	3- 9 1/8	3-11 1/2	4- 1 7/8	4- 4 1/4	4- 6 5/8	19
20	1-10 1/2	2- 1	2- 3 1/2	2- 6	2- 8 1/2	2-11	3- 1 1/2	3- 4	3- 6 1/2	3- 9	3-11 1/2	4- 2	4- 4 1/2	4- 7	4- 9 1/2	20
21	1-11 5/8	2- 2 1/4	2- 4 7/8	2- 7 1/2	2-10 1/8	3- 0 3/4	3- 3 3/8	3- 6	3- 8 5/8	3-11 1/4	4- 1 7/8	4- 4 1/2	4- 7 1/8	4- 9 3/4	5- 0 3/8	21
22	2- 0 3/4	2- 3 1/2	2- 6 1/4	2- 9	2-11 3/4	3- 2 1/2	3- 5 1/4	3- 8	3-10 3/4	4- 1 1/2	4- 4 1/4	4- 7	4- 9 3/4	5- 0 1/2	5- 3 1/4	22
23	2- 1 7/8	2- 4 3/8	2- 7 1/8	2-10 1/2	3- 1 3/8	3- 4 1/4	3- 7 1/8	3-10	4- 0 7/8	4- 3 3/4	4- 6 5/8	4- 9 1/2	5- 0 3/8	5- 3 1/4	5- 6 1/8	23
24	2- 3	2- 6	2- 9	3- 0	3- 3	3- 6	3- 9	4- 0	4- 3	4- 6	4- 9	5- 0	5- 3	5- 6	5- 9	24
25	2- 4 1/8	2- 7 1/4	2-10 3/8	3- 1 1/2	3- 4 5/8	3- 7 3/4	3-10 7/8	4- 2	4- 5 1/8	4- 8 1/4	4-11 3/8	5- 2 1/2	5- 5 5/8	5- 8 3/4	5-11 7/8	25
26	2- 5 1/4	2- 8 1/2	2-11 3/4	3- 3	3- 6 1/4	3- 9 1/2	4- 0 3/4	4- 4	4- 7 1/4	4-10 1/2	5- 1 3/4	5- 5	5- 8 1/4	5-11 1/2	6- 2 3/4	26
27	2- 6 3/8	2- 9 3/4	3- 1 1/8	3- 4 1/2	3- 7 7/8	3-11 1/4	4- 2 5/8	4- 6	4- 9 3/8	5- 0 3/4	5- 4 1/8	5- 7 1/2	5-10 7/8	6- 2 1/4	6- 5 5/8	27
28	2- 7 1/2	2-11	3- 2 1/2	3- 6	3- 9 1/2	4- 1	4- 4 1/2	4- 8	4-11 1/2	5- 3	5- 6 1/2	5-10	6- 1 1/2	6- 5	6- 8 1/2	28
29	2- 8 5/8	3- 0 3/4	3- 3 7/8	3- 7 1/2	3-11 1/8	4- 2 3/4	4- 6 5/8	4-10	5- 1 3/8	5- 5 1/4	5- 8 7/8	6- 0 1/2	6- 4 1/8	6- 7 3/4	6-11 3/8	29
30	2- 9 3/4	3- 1 1/2	3- 5 1/4	3- 9	4- 0 3/4	4- 4 1/2	4- 8 1/4	5- 0	5- 3 3/4	5- 7 1/2	5-11 1/4	6- 3	6- 6 3/4	6-10 1/2	7- 2 1/4	30
SPACES	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	SPACES
	PITCH IN INCHES															

MULTIPLICATION TABLE

For Rivetspacing

SPACES	PITCH IN INCHES															SPACES
	3	3 1/8	3 1/4	3 3/8	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 1/2	5 3/4	6	
1																1
2	-6	- 6 1/4	- 6 1/2	- 6 3/4	- 7	- 7 1/2	-8	- 8 1/2	- 9	- 9 1/2	-10	-10 1/2	-11	-11 1/2	1-0	2
3	-9	- 9 3/8	- 9 3/4	-10 1/8	-10 1/2	- 11 1/4	1-0	1- 0 3/4	1- 1 1/2	1- 2 1/4	1- 3	1- 3 3/4	1- 4 1/2	1- 5 1/4	1-6	3
4	1-0	1- 0 1/2	1- 1	1- 1 1/2	1- 2	1- 3	1-4	1- 5	1- 6	1- 7	1- 8	1- 9	1-10	1-11	2-0	4
5	1-3	1- 3 1/8	1- 4 1/4	1- 4 7/8	1- 5 1/2	1- 6 3/4	1-8	1- 9 1/4	1-10 1/2	1-11 3/4	2- 1	2- 2 1/4	2- 3 1/2	2- 4 3/4	2-6	5
6	1-6	1- 6 3/4	1- 7 1/2	1- 8 1/4	1- 9	1-10 1/2	2-0	2- 1 1/2	2- 3	2- 4 1/2	2- 6	2- 7 1/2	2- 9	2-10 1/2	3-0	6
7	1-9	1- 9 7/8	1-10 3/4	1-11 5/8	2- 0 1/2	2- 2 1/4	2-4	2- 5 1/4	2- 7 1/2	2- 9 1/4	2-11	3- 0 1/4	3- 2 1/2	3- 4 3/4	3-6	7
8	2-0	2- 1	2- 2	2- 3	2- 4	2- 6	2-8	2-10	3- 0	3- 2	3- 4	3- 6	3- 8	3-10	4-0	8
9	2-3	2- 4 1/8	2- 5 1/4	2- 6 3/8	2- 7 1/2	2- 9 3/4	3-0	3- 2 1/4	3- 4 1/2	3- 6 3/4	3- 9	3-11 1/4	4- 1 1/2	4- 3 3/4	4-6	9
10	2-6	2- 7 1/4	2- 8 1/2	2- 9 3/4	2-11	3- 1 1/2	3-4	3- 6 1/2	3- 9	3-11 1/2	4- 2	4- 4 1/2	4- 7	4- 9 1/2	5-0	10
11	2-9	2-10 3/8	2-11 3/4	3- 1 1/8	3- 2 1/2	3- 5 1/4	3-8	3-10 3/4	4- 1 1/2	4- 4 1/4	4- 7	4- 9 3/4	5- 0 1/2	5- 3 1/4	5-6	11
12	3-0	3- 1 1/2	3- 3	3- 4 1/2	3- 6	3- 9	4-0	4- 3	4- 6	4- 9	5- 0	5- 3	5- 6	5- 9	6-0	12
13	3-3	3- 4 5/8	3- 6 1/4	3- 7 7/8	3- 9 1/2	4- 0 3/4	4-4	4- 7 1/4	4-10 1/2	5- 1 3/4	5- 5	5- 8 1/4	5-11 1/2	6- 2 3/4	6-6	13
14	3-6	3- 7 3/4	3- 9 1/2	3-11 1/4	4- 1	4- 4 1/2	4-8	4-11 1/2	5- 3	5- 6 1/2	5-10	6- 1 1/2	6- 5	6- 8 1/2	7-0	14
15	3-9	3-10 7/8	4- 0 3/4	4- 2 5/8	4- 4 1/2	4- 8 1/4	5-0	5- 3 3/4	5- 7 1/2	5-11 1/4	6- 3	6- 6 3/4	6-10 1/2	7- 2 1/4	7-6	15
16	4-0	4- 2	4- 4	4- 6	4- 8	5- 0	5-4	5- 8	6- 0	6- 4	6- 8	7- 0	7- 4	7- 8	8-0	16
17	4-3	4- 5 1/8	4- 7 1/4	4- 9 3/8	4-11 1/2	5- 3 3/4	5-8	6- 0 1/4	6- 4 1/2	6- 8 3/4	7- 1	7- 5 1/4	7- 9 1/2	8- 1 3/4	8-6	17
18	4-6	4- 8 1/4	4-10 1/2	5- 0 3/4	5- 3	5- 7 1/2	6-0	6- 4 1/2	6- 9	7- 1 1/2	7- 6	7-10 1/2	8- 3	8- 7 1/2	9-0	18
19	4-9	4-11 3/8	5- 1 3/4	5- 4 1/8	5- 6 1/2	5-11 1/4	6-4	6- 8 3/4	7- 1 1/2	7- 6 1/4	7-11	8- 3 3/4	8- 8 1/2	9- 1 1/4	9-6	19
20	5-0	5- 2 1/2	5- 5	5- 7 1/2	5-10	6- 3	6-8	7- 1	7- 6	7-11	8- 4	8- 9	9- 2	9- 7	10-0	20
21	5-3	5- 5 5/8	5- 8 1/4	5-10 7/8	6- 1 1/2	6- 6 3/4	7-0	7- 5 1/4	7-10 1/2	8- 3 3/4	8- 9	9- 2 1/4	9- 7 1/2	10- 0 3/4	10-6	21
22	5-6	5- 8 3/4	5-11 1/2	6- 2 1/4	6- 5	6-10 1/2	7-4	7- 9 1/2	8- 3	8- 8 1/2	9- 2	9- 7 1/2	10- 1	10- 6 1/2	11-0	22
23	5-9	5-11 7/8	6- 2 3/4	6- 5 5/8	6- 8 1/2	7- 2 1/4	7-8	8- 1 3/4	8- 7 1/2	9- 1 1/4	9- 7	10- 0 1/4	10- 6 1/2	11- 0 1/4	11-6	23
24	6-0	6- 3	6- 6	6- 9	7- 0	7- 6	8-0	8- 6	9- 0	9- 6	10- 0	10- 6	11- 0	11- 6	12-0	24
25	6-3	6- 6 1/8	6- 9 1/4	7- 0 3/8	7- 3 1/2	7- 9 3/4	8-4	8-10 1/4	9- 4 1/2	9-10 3/4	10- 5	10-11 1/4	11- 5 1/2	11-11 3/4	12-6	25
26	6-6	6- 9 1/4	7- 0 1/2	7- 3 3/4	7- 7	8- 1 1/2	8-8	9- 2 1/2	9- 9	10- 3 1/2	10-10	11- 4 1/2	11-11	12- 5 1/2	13-0	26
27	6-9	7- 0 3/8	7- 3 3/4	7- 7 1/8	7-10 1/2	8- 5 1/4	9-0	9- 6 3/4	10- 1 1/2	10- 8 1/4	11- 3	11- 9 1/4	12- 4 1/2	12-11 1/4	13-6	27
28	7-0	7- 3 1/8	7- 7	7-10 1/2	8- 2	8- 9	9-4	9-11	10- 6	11- 1	11- 8	12- 3	12-10	13- 5	14-0	28
29	7-3	7- 6 3/8	7-10 1/4	8- 1 7/8	8- 5 1/2	9- 0 3/4	9-8	10- 3 1/4	10-10 1/2	11- 5 3/4	12- 1	12- 8 1/4	13- 3 1/2	13-10 3/4	14-6	29
30	7-6	7- 9 3/4	8- 1 1/2	8- 5 1/4	8- 9	9- 4 1/2	10-0	10- 7 1/2	11- 3	11-10 1/2	12- 6	13- 1 1/2	13- 9	14- 4 1/2	15-0	30
SPACES	3	3 1/8	3 1/4	3 3/8	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 1/2	5 3/4	6	SPACES
	PITCH IN INCHES															

EXTREME LENGTHS OF PLATES

(Rolled by Carnegie Steel Co.)

WIDTH IN INCHES	THICKNESS IN INCHES																		WIDTH IN INCHES
U. M. PLATES	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	1	1 1/8	1 1/4	1 1/2				
10	45-0	50-0	70-0	70-0	70-0	70-0	70-0		70-0		70-0	70-0	70-0	70-0	70-0				10
14	45-0	50-0	75-0	75-0	85-0	85-0	85-0		75-0		75-0	75-0	70-0	70-0	70-0				14
16	45-0	50-0	80-0	80-0	85-0	85-0	85-0		80-0		80-0	80-0	65-0	65-0	60-0				16
20	45-0	50-0	100-0	100-0	95-0	90-0	85-0		80-0		80-0	75-0	65-0	60-0	50-0				20
25	45-0	50-0	100-0	100-0	95-0	90-0	85-0		75-0		70-0	65-0	60-0	50-0	40-0				25
30		40-0	90-0	90-0	95-0	90-0	85-0		65-0		60-0	50-0	40-0	40-0	30-0				30
35		40-0	90-0	90-0	90-0	30-0	80-0		65-0		50-0	45-0	40-0	35-0	25-0				35
40			80-0	80-0	90-0	90-0	80-0		65-0		50-0	40-0	35-0	30-0	25-0				40
45			70-0	80-0	80-0	80-0	80-0		65-0		50-0	35-0	30-0	27-0	25-0				45
48			70-0	80-0	80-0	80-0	80-0		65-0		50-0	35-0	30-0	27-0	25-0				48
56	29-2	33-4	41-8	41-8	41-8	41-8	40-0	35-10	34-2	31-8	30-0	27-6	25-0	22-1	21-8				56
64	25-0	29-2	38-4	40-0	40-0	37-6	33-4	31-8	30-0	28-4	26-8	24-2	21-8	19-2	18-9				64
72	22-11	26-8	35-0	35-10	34-2	32-6	29-2	27-6	26-8	25-0	22-6	20-10	19-2	17-1	16-8				72
76	21-8	25-0	33-4	35-0	32-6	30-10	27-6	25-10	25-0	23-4	21-8	20-0	18-4	16-3	16-3				76
80	20-5	22-11	31-8	33-4	30-10	30-0	25-10	23-4	23-4	21-8	19-2	19-2	17-6	15-5	15-5				80
84	15-10	18-4	30-0	31-8	30-0	28-4	25-0	21-8	20-10	20-5	18-4	17-11	15-10	14-7	14-7				84
90	13-4	17-6	27-6	28-4	27-8	24-2	21-8	20-0	18-4	17-11	17-1	16-3	14-7	12-11	12-11				90
96	10-10	16-8	25-10	25-10	24-2	22-6	20-0	18-4	17-6	16-8	15-10	15-0	13-4	12-1	12-1				96
100	8-4	13-4	16-8	20-5	20-0	19-2	18-4	16-8	16-8	15-10	15-0	14-2	12-6	11-8	11-8				100
105		12-6	16-8	19-2	18-4	17-6	16-8	15-10	15-10	15-0	14-2	13-4	12-1	10-5	10-0				105
108			14-2	16-8	16-8	15-10	15-0	15-0	15-0	14-2	13-4	12-6	11-8	10-0	9-2				108
110				13-4	14-2	14-2	13-4	13-4	13-4	12-6	11-8	10-10	10-0	9-2					110
112					13-4	13-9	13-4	12-11	12-11	12-6	11-3	10-5	10-0	9-4	9-4				112
115						11-8	11-8	12-6	12-6	11-8	10-10	10-5	10-0						115
118							11-3	11-3	10-10	10-10	10-5	10-0	10-0						118
120							10-10	10-10	10-5	10-5	10-5	10-0	10-0						120
WIDTH IN INCHES	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	1	1 1/8	1 1/4	1 1/2				WIDTH IN INCHES
SHEARED PLATES	THICKNESS IN INCHES																		SHEARED PLATES

NOTE: For intermediate widths not given use the next greater width.

DECIMAL PARTS.

	DECIMAL PARTS OF A FOOT												DECIMAL PARTS OF AN INCH	
	0	1	2	3	4	5	6	7	8	9	10	11		
	.0	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167		
1/32	.0026	.0859	.1693	.2526	.3359	.4193	.5026	.5859	.6693	.7526	.8359	.9193	1/32	.0313
1/16	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219	1/16	.0625
3/32	.0078	.0911	.1745	.2578	.3411	.4245	.5078	.5911	.6745	.7578	.8411	.9245	3/32	.0938
1/8	.0104	.0938	.1771	.2604	.3438	.4271	.5104	.5938	.6771	.7604	.8438	.9271	1/8	.125
5/32	.0130	.0964	.1797	.2630	.3464	.4297	.5130	.5964	.6797	.7630	.8464	.9297	5/32	.1563
3/16	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323	3/16	.1875
7/32	.0182	.1016	.1849	.2682	.3516	.4349	.5182	.6016	.6849	.7682	.8516	.9349	7/32	.2188
1/4	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375	1/4	.25
9/32	.0234	.1068	.1901	.2734	.3568	.4401	.5234	.6068	.6901	.7734	.8568	.9401	9/32	.2813
5/16	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427	5/16	.3125
11/32	.0286	.1120	.1953	.2786	.3620	.4453	.5286	.6120	.6953	.7786	.8620	.9453	11/32	.3438
3/8	.0313	.1146	.1979	.2813	.3646	.4479	.5313	.6146	.6979	.7813	.8646	.9479	3/8	.375
13/32	.0339	.1172	.2005	.2839	.3672	.4505	.5339	.6172	.7005	.7839	.8672	.9505	13/32	.4063
7/16	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531	7/16	.4375
15/32	.0391	.1224	.2057	.2891	.3724	.4557	.5391	.6224	.7057	.7891	.8724	.9557	15/32	.4688
1/2	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583	1/2	.5
17/32	.0443	.1276	.2109	.2943	.3776	.4609	.5443	.6276	.7109	.7943	.8776	.9609	17/32	.5313
9/16	.0469	.1302	.2135	.2969	.3802	.4635	.5469	.6302	.7135	.7969	.8802	.9635	9/16	.5625
19/32	.0495	.1328	.2161	.2995	.3828	.4661	.5495	.6328	.7161	.7995	.8828	.9661	19/32	.5938
5/8	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688	5/8	.625
21/32	.0547	.1380	.2214	.3047	.3880	.4714	.5547	.6380	.7214	.8047	.8880	.9714	21/32	.6563
11/16	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740	11/16	.6875
23/32	.0599	.1432	.2266	.3099	.3932	.4766	.5599	.6432	.7266	.8099	.8932	.9766	23/32	.7188
3/4	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792	3/4	.75
25/32	.0651	.1484	.2318	.3151	.3984	.4818	.5651	.6484	.7318	.8151	.8984	.9818	25/32	.7813
13/16	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844	13/16	.8125
27/32	.0703	.1536	2370	.3203	.4036	.4870	.5703	.6536	.7370	.8203	.9036	.9870	27/32	.8438
7/8	.0729	.1563	.2396	.3229	.4063	.4896	.5729	.6563	.7396	.8229	.9063	.9896	7/8	.875
29/32	.0755	.1589	.2422	.3255	.4089	.4922	.5755	.6589	.7422	.8255	.9089	.9922	29/32	.9063
15/16	.0781	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7448	.8281	.9115	.9948	15/16	.9375
31/32	.0807	.1641	.2474	.3307	.4141	.4974	.5807	.6641	.7474	.8307	.9141	.9974	31/32	.9688

36"
35"
34"

Bridge #720 Big Run, Evansville, Arizona.

M. K. and T. Ry. Middle Div.

3 Spans, Single Track, Through 175'-0" c. c. End Pins.

TOP CHORDS AND END POSTS.

Scale 3/4" - 1 ft.

AMERICAN BRIDGE CO.,

EDGEMOOR PLANT.

A. B. Co. Contr. No. 932 In Charge of Wilson.

Made by J.C. Date 9/25/00 Rev. 9/30

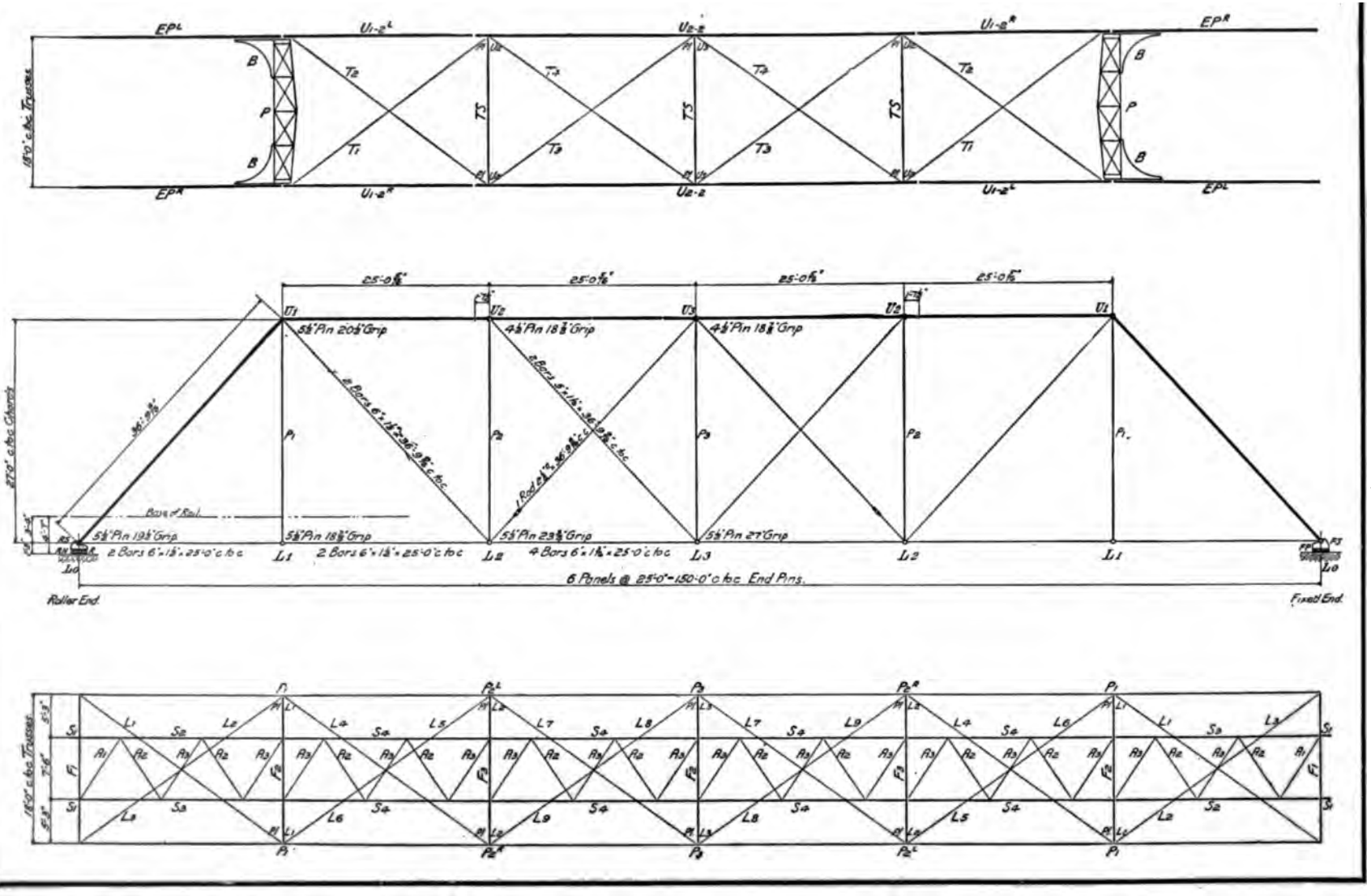
Checked by E.K. Date 9/27/00 Rev.

ORDER NO. K230 a SHEET NO. 12

24"
23"
22"

Cut Blue Print on this line

TITLE FOR BRIDGE-WORK.


EP L
U1-2 L
U2-2 L
U1-2 R
EP R
B
P
T2
T3
T1
T5
18'0" c.to.c. Trusses
EP R
U1-2 R
U2-2
U1-2 L
EP L
25-0 5/8"
U1
U2
U3
U4
5 1/2" Pin 20 1/2" Grip
4 1/2" Pin 18 3/8" Grip
4 1/2" Pin 18 3/8" Grip
2 Bars 6" x 1 1/8" x 25'-0" c.to.c.
1 Rod 6 1/2" x 36'-9 3/8" c.to.c.
27'0" c.to.c. Chords
Base of Rail
5 1/2" Pin 19 1/2" Grip
5 1/2" Pin 18 3/8" Grip
5 1/2" Pin 23 3/8" Grip
5 1/2" Pin 27" Grip
2 Bars 6" x 1 1/8" x 25'-0" c.to.c.
2 Bars 6" x 1 1/8" x 25'-0" c.to.c.
4 Bars 6" x 1 1/8" x 25'-0" c.to.c.
L0
L1
L2
L3
6 Panels @ 25'-0" = 150'-0" c.to.c. End Pins.
Roller End.
Fixed End.
18'0" c.to.c. Trusses.

51

2ND. FLOOR GIRDERS #3, 4, 5 AND 6.

ATLANTIC MUTUAL INS. CO. BLDG. NEW YORK.

Scale 3/4" = 1 Foot.

AMERICAN BRIDGE CO.,

EDGEMOOR PLANT.

A. B. Co. Contr. No._____ In Charge of_____

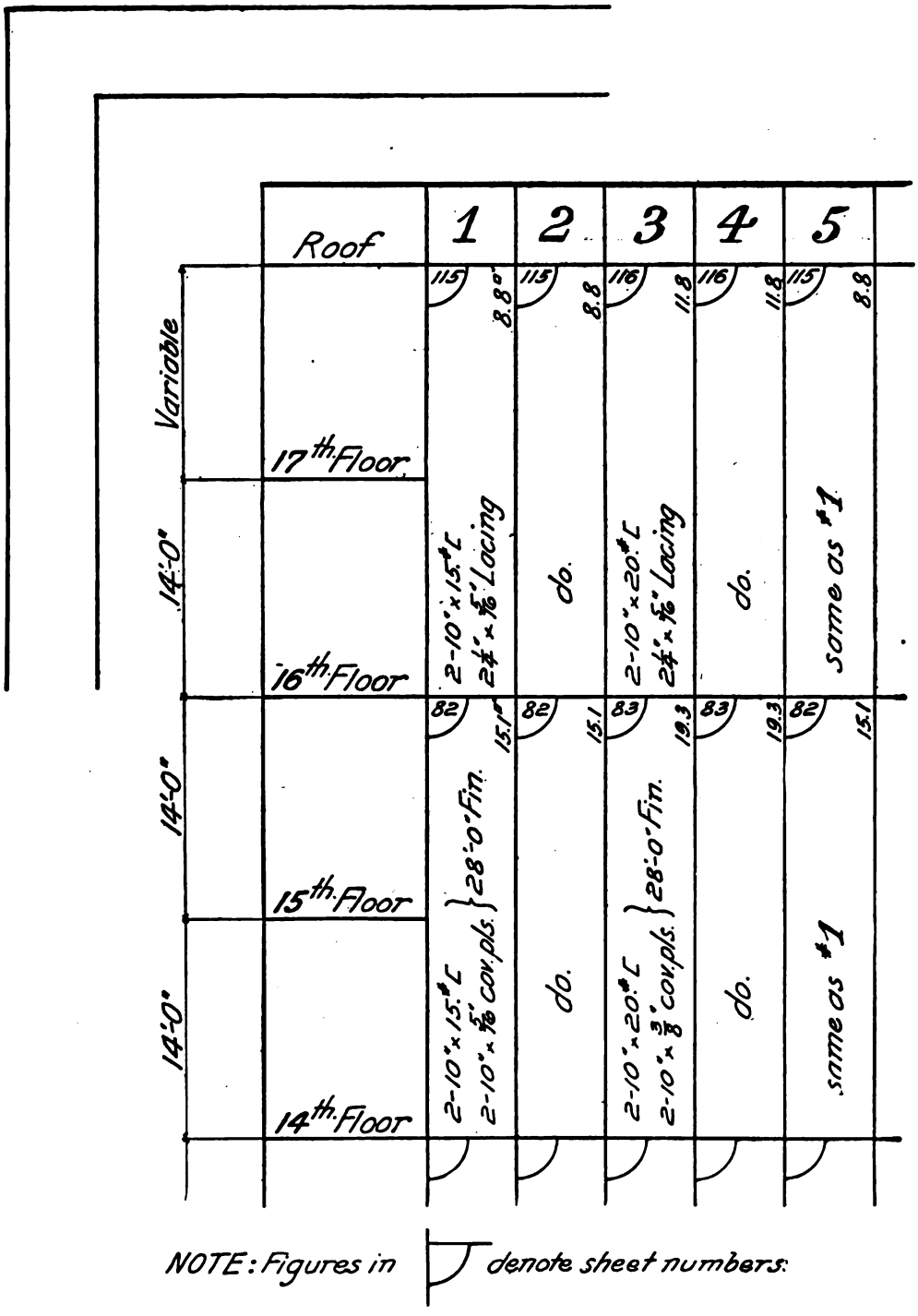
Made by_____ Date_____ Rev._____

Checked by_____ Date_____ Rev._____

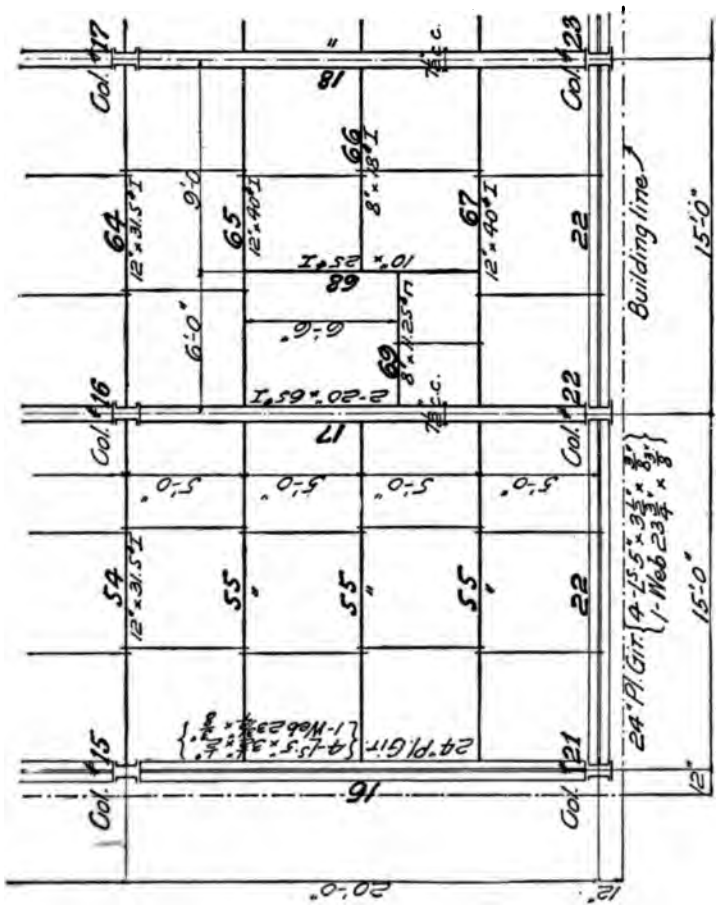
ORDER NO._____ **SHEET NO.**_____

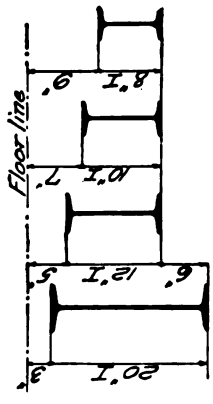
TITLE FOR BUILDING-WORK.

COLUMN SCHEDULE.



LAY-OUT FOR BUILDING-WORK.





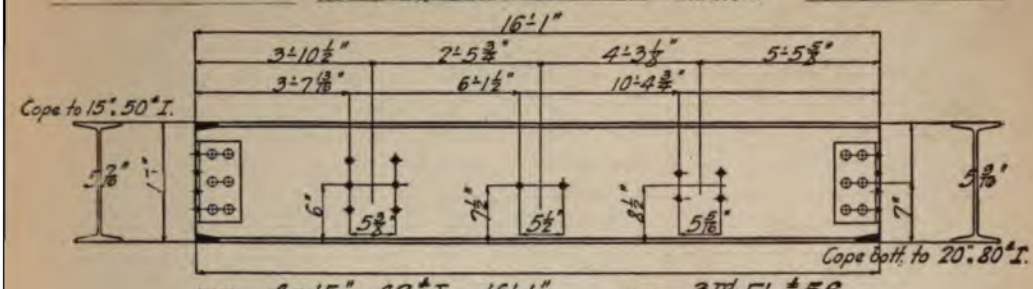
A. B. Co. Engr. Dept. Form 13.

ORDER NO. 0238
A.B.Co.CONTR.# 1803

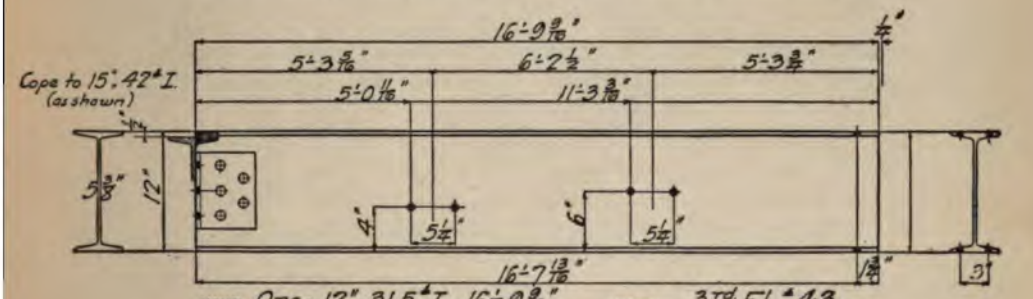
AMERICAN BRIDGE COMPANY.

SHEET NO. 3

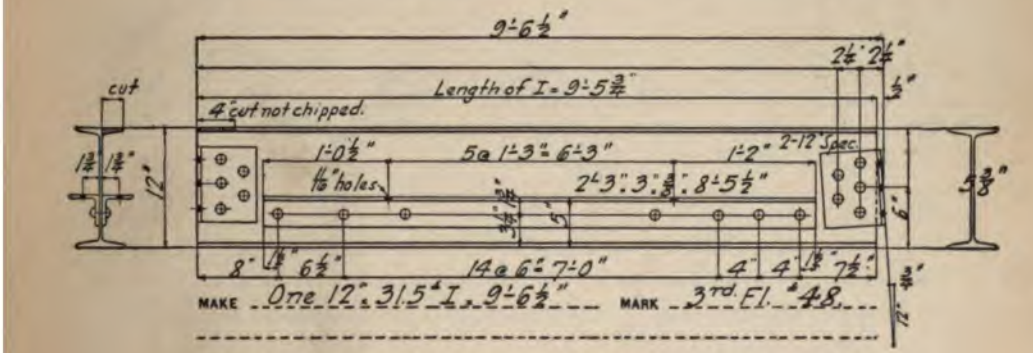
EDGEMOOR BRANCH.



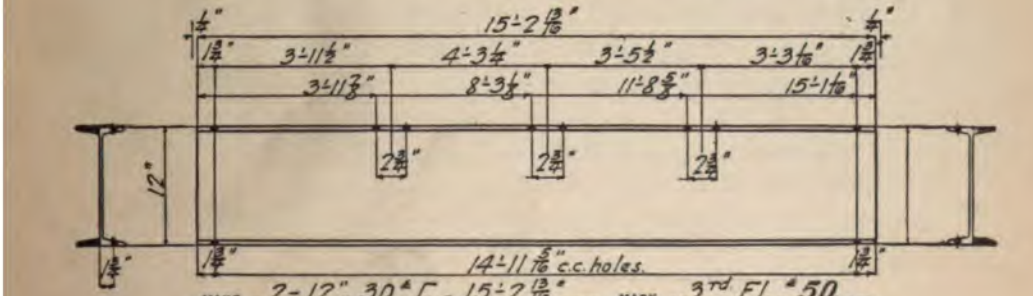
MAKE 4-15"-42# I-16'-1" MARK 3rd Fl. #56.



MAKE One-12"-31.5#I-16'-9 3/16" MARK 3rd Fl. #43.



MAKE One 12"-31.5#I-9'-6½" MARK 3rd Fl. #48.



MAKE 2-12"-30#C-15'-2 13/16" MARK 3rd Fl. #50.

RIVETS 3/4" diam.
HOLES 13/16" diam.

3rd Floor Beams.

TRAIN SHED. CAMDEN FERRY. P.R.R.

MADE BY P.C. 3/14 1901.
CHECKED BY M.O. 3/16 1901.
IN CHARGE OF Martin.

A. B. Co. Engr. Dept. Form 19.

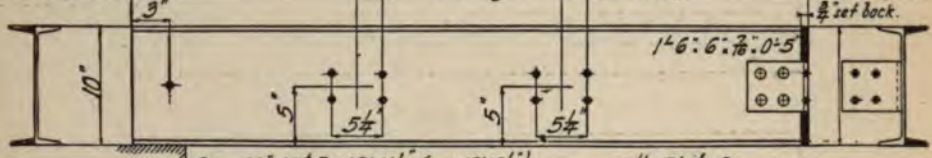
ORDER NO. X1342
A.B.Co. CONTR. 1608

AMERICAN BRIDGE COMPANY.

SHEET NO. 62

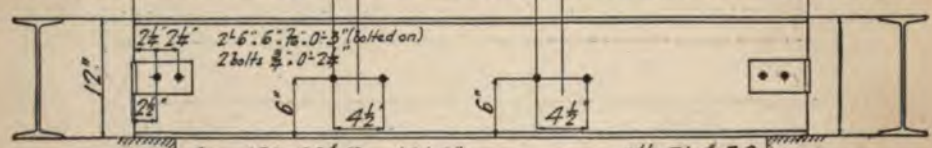
LASSIG. BRANCH.

	3'-5"	5'-2 3/4"	4'-3 1/2"	6
	3'-5 1/4"	6'-1 1/2"	3'-6"	17
	2'-1"	4'-2 3/4"	6'-2 1/2"	27
12'-11 1/4"		9'-3 5/8"	4'-0 7/8"	6
13'-0 3/4"		9'-4 3/8"	3'-3 3/8"	17
12'-6 1/4"		10'-2 5/8"	5'-11 3/8"	27



MAKE One 10" 15# I - 12'-11 1/4" (ord. 12'-10 1/2") MARK 4th Fl. 6
" " " - 13'-0 3/4" (" 13'-0") " 4th Fl. 17
" " " - 12'-6 1/4" (" 12'-5 1/2") " 4th Fl. 27

50	5'-0"	4'-3"	5'-3"	
32	4'-9"	4'-5 1/2"	6'-2"	
43	4'-5"	5'-0"	5'-11 3/8"	
50	4'-9 3/8"	9'-0 7/8"		14'-6"
32	4'-6 3/8"	9'-0 1/4"		15'-4 1/2"
43	4'-2 3/8"	9'-2 3/8"		15'-4 3/8"



MAKE One 12" 40# I - 14'-6" MARK 4th Fl. 50
" " " - 15'-4 1/2" 4th Fl. 32
" " " - 15'-4 3/8" 4th Fl. 43

RIVETS 3/4" diam.
HOLES 13/16" "

4th Floor Beams.
MARQUETTE BL'D'G CHICAGO.

MADE BY O.K. 5/6 1900.
CHECKED BY W.M. 5/10 1900.
IN CHARGE OF SEEDS.

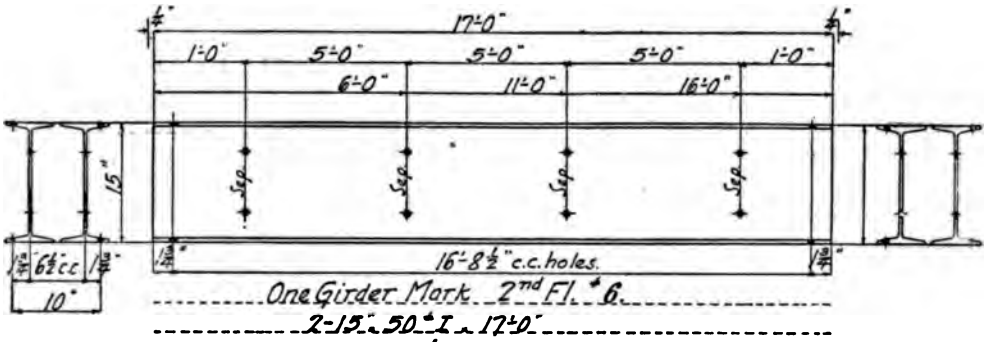
A. B. Co. Engr. Dept. Form 23.

ORDER NO. X1592
A.B.Co. CONTR.# 1805

AMERICAN BRIDGE COMPANY.

SHEET NO. 32

SHIFFLER. BRANCH.

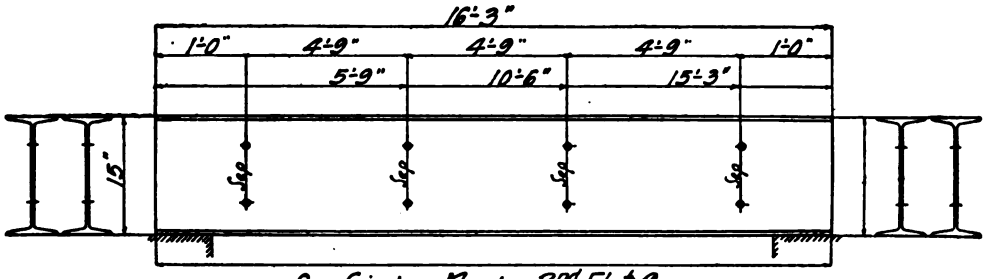


One Girder Mark 2nd Fl. # 6.

2-15" 50# I - 17'-0"

4-C.I. Seps. # 15 - 0'-6" lg.

8-¾" Bolts - 0'-8" lg.

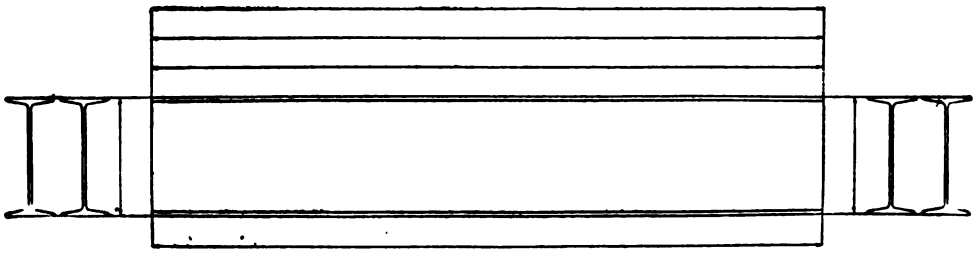


One Girder Mark 2nd Fl. # 9.

2-15" 50# I - 16'-3" } Ship Loose.

4-C.I. Seps. # 15 - 0'-6" lg. }

8-¾" Bolts - 0'-8" lg. }



Holes ¹³/₁₆" diam.

Paint One coat of graphite.

2nd Floor Beams.

UNION PASSENGER STA. PITTSBURGH.

Made by A.B. 9/25 1900.

Checked by X.Y. 9/27 1900.

In Charge of Doe

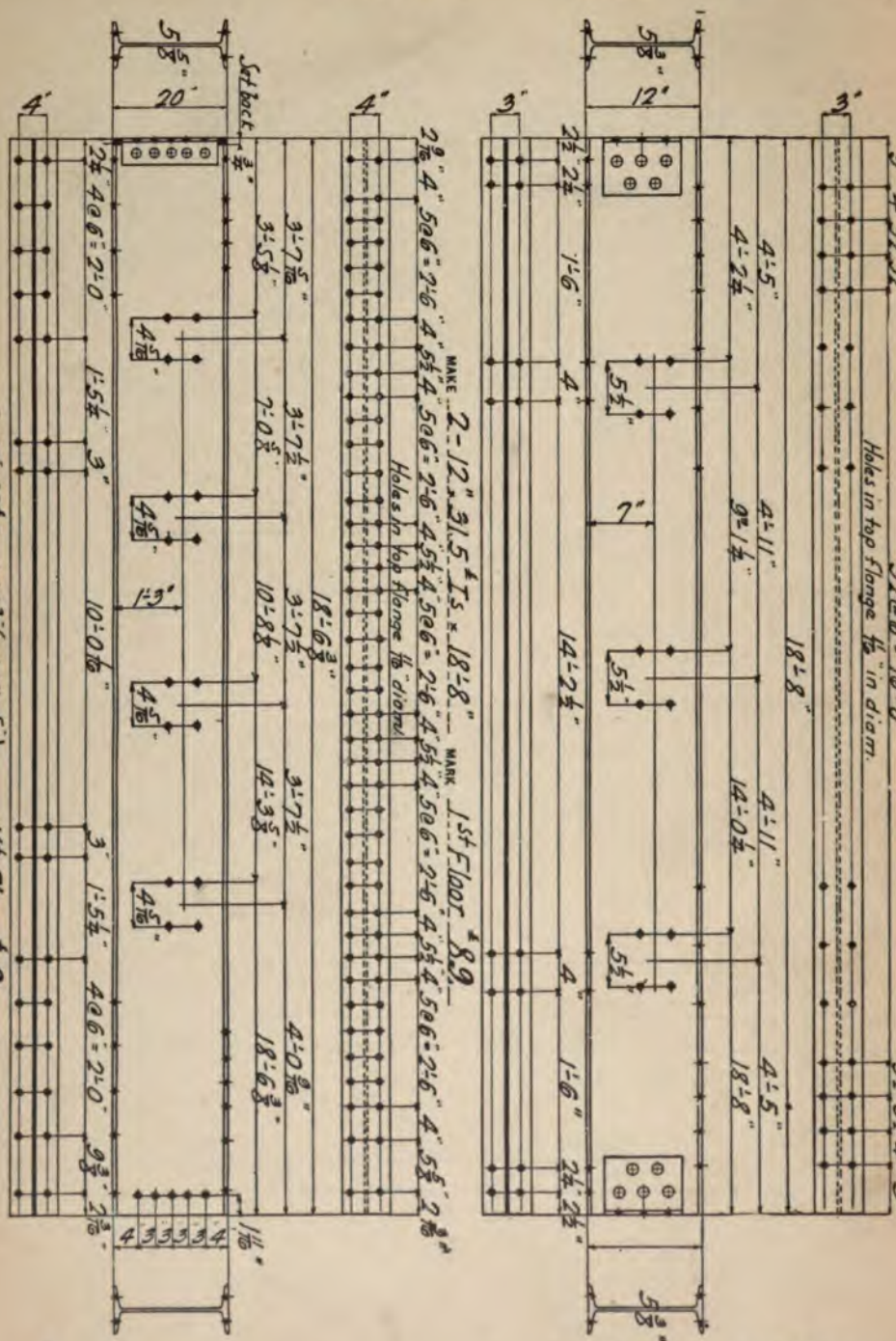
A. B. Co. Engr Dept. Form 21

ORDER NO. 2720
A.B.Co. CONT. 1837.

AMERICAN BRIDGE COMPANY.

BROOKLYN BRANCH.

SHEET NO. 18

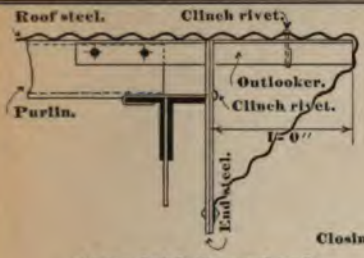


RIVETS 3/4" diam.
HOLES 13/16" diam. unless marked otherwise.

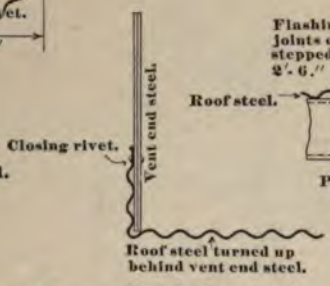
First Floor Beams.
U. S. CUSTOM HOUSE. NEW YORK.

MADE BY W. F. 8/28 1901.
CHECKED BY E.K. 8/30 1901.
IN CHARGE OF Krueger

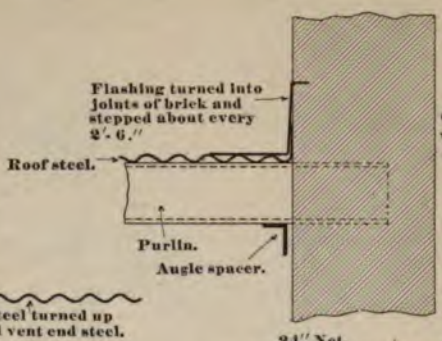
CORRUGATED STEEL.

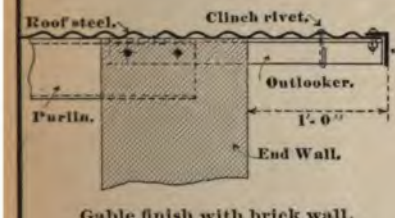


Gable finish for steel end.

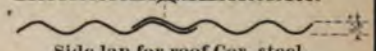


Finish of vent ends.


Flashing turned into joints of brick and stepped about every 2'-6".
Roof steel.
Purlin.
Angle spacer.
Gable finish with parapet wall.



Gable finish with brick wall.



Side lap for roof Cor. steel.

Corrugated steel for roofing is rolled from a sheet 30" wide in the flat, 27½" wide when rolled one edge up and one down. Laid with 1½" corrugations lap will cover 24" of roof.

When ordering state distinctly that the sheeting is for roofing; is to be 27½" wide after corrugating; corrugations to be ⅝" deep; whether sheeting is to be galvanized or black, painted; give gage specified.

Order sheets, wherever possible, in even feet lengths to span two purlin spaces.

Allow 6" end lap for roofs of 6" pitch.
Allow 8" end lap for roofs of 4" pitch.
For roofs of less than 4" pitch lap 8" and lay with Slater's Cement.

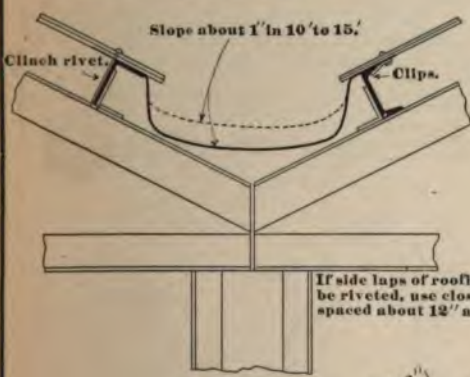
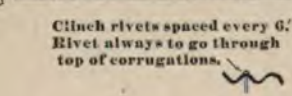
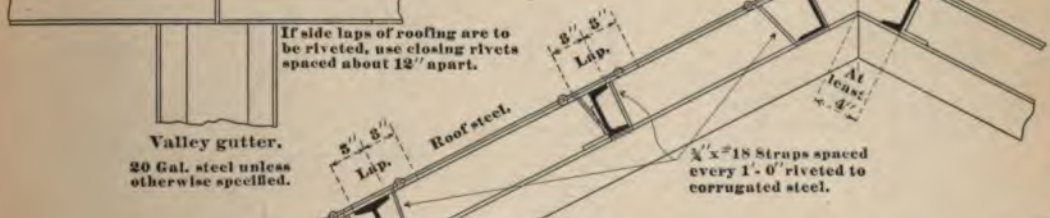


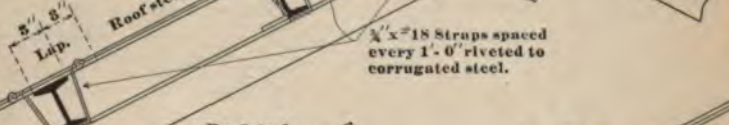
Table of clinch rivets.

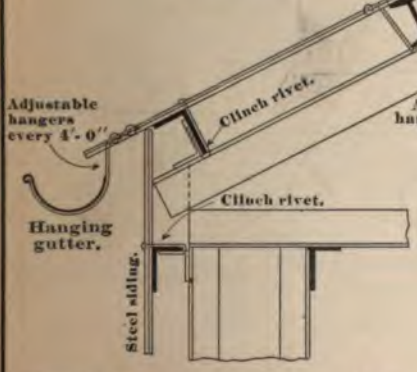
Purlin leg.	2"	2½"-3"	3½"	4"-4½"
Length.	4"	5"	6"	7"
No. per. pound.	48.	38.	33.	27.



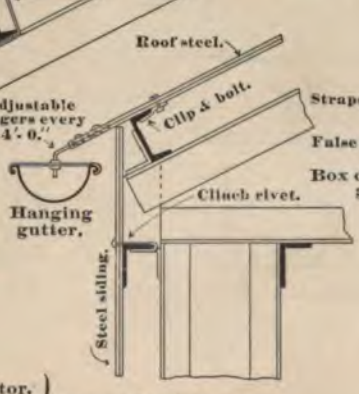


Valley gutter.
20 Gal. steel unless otherwise specified.

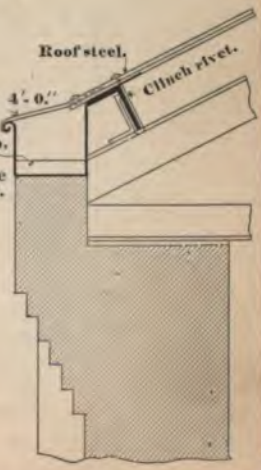




Hanging gutter.



Hanging gutter.



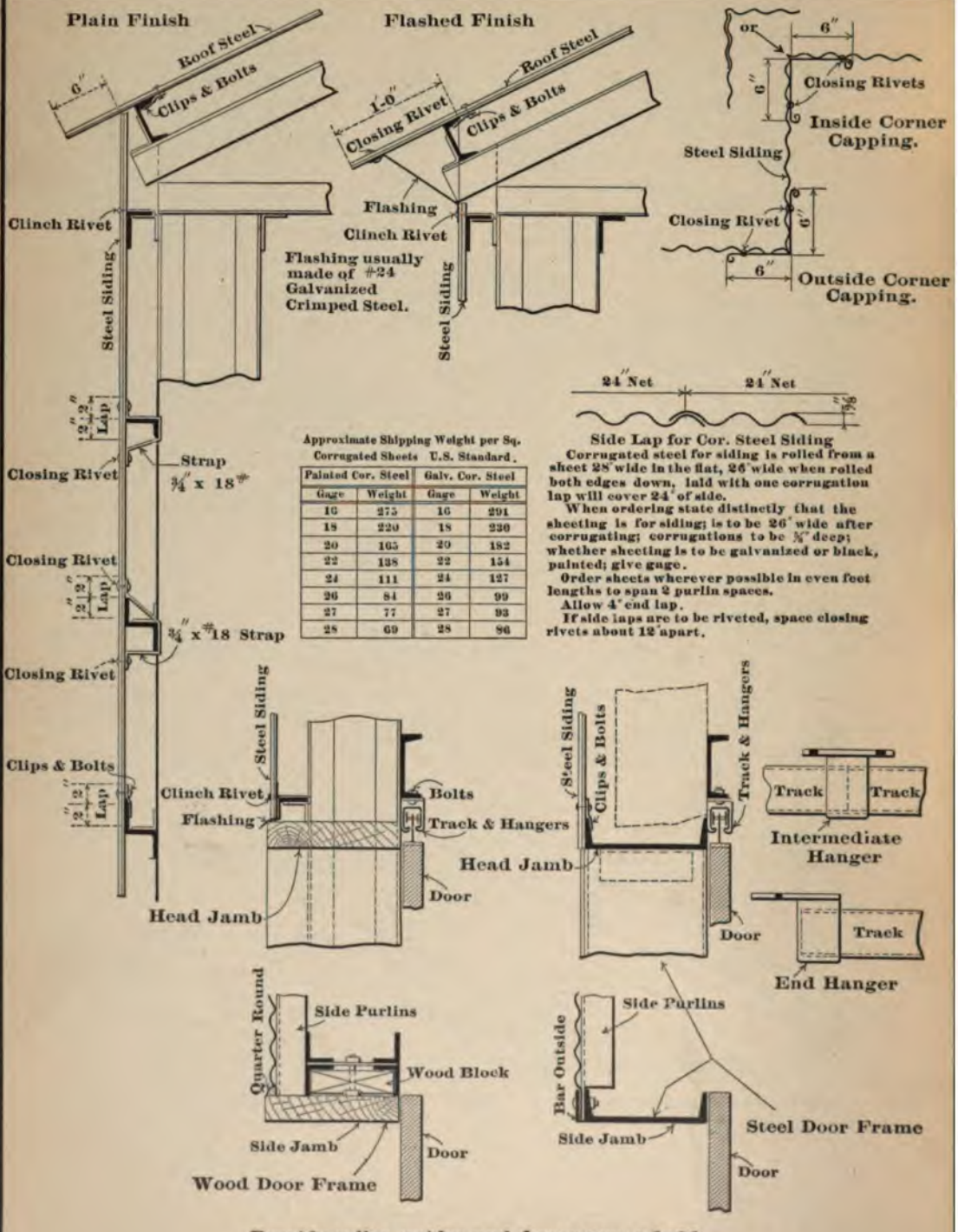
Box cornice gutter.

Spans of roof.	Gutter.	Conductor.
Up to 50'	6"	4" Every 40'
50' to 70'	7"	5" " "
70' to 100'	8"	5" " "

Made of #24 Gal. steel unless otherwise specified.

Hanging gutters should slope at least 1" in 15'.

CORRUGATED STEEL.



Approximate Shipping Weight per Sq.
Corrugated Sheets U.S. Standard.

Painted Cor. Steel		Galv. Cor. Steel	
Gage	Weight	Gage	Weight
16	275	16	291
18	220	18	230
20	165	20	182
22	138	22	154
24	111	24	127
26	84	26	99
27	77	27	93
28	69	28	86

Side Lap for Cor. Steel Siding

Corrugated steel for siding is rolled from a sheet 28" wide in the flat, 26" wide when rolled both edges down, laid with one corrugation lap will cover 24" of side.

When ordering state distinctly that the sheeting is for siding; is to be 26" wide after corrugating; corrugations to be ¾" deep; whether sheeting is to be galvanized or black, painted; give gage.

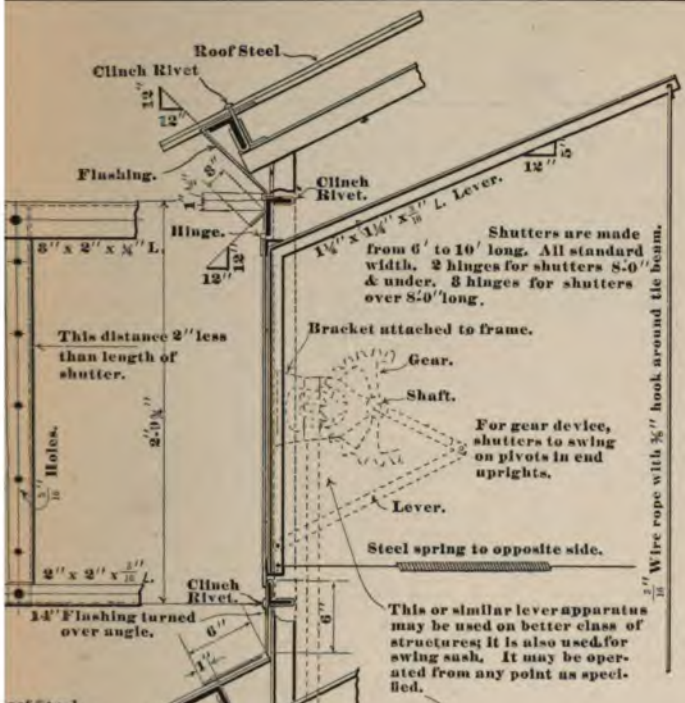
Order sheets wherever possible in even feet lengths to span 2 purlin spaces.

Allow 4" end lap.

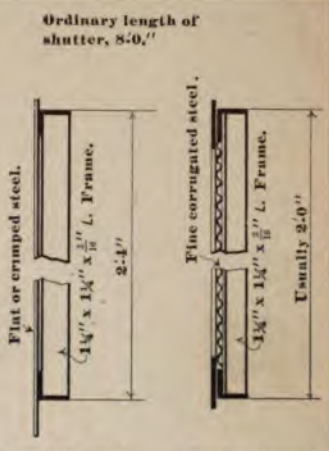
If side laps are to be riveted, space closing rivets about 12" apart.

Provide roller guides and door stops to hold doors securely in place when open or shut

CORRUGATED STEEL


Roof Steel.
Clinch Rivet.
12"
12"
Flashing.
Clinch Rivet.
12"
Hinge.
1¼" x 1¼" x 5/16" L. Lever.
Shutters are made from 6' to 10' long. All standard width. 2 hinges for shutters 8'-0" & under. 3 hinges for shutters over 8'-0" long.
5" x 2" x ¼" L.
This distance 2" less than length of shutter.
Bracket attached to frame.
Gear.
Shaft.
For gear device, shutters to swing on pivots in end uprights.
Holes.
Lever.
Steel spring to opposite side.
5/16" Wire rope with ⅜" hook around tie beam.
2" x 2" x 5/16" L.
Clinch Rivet.
14" Flashing turned over angle.
6"
6"
This or similar lever apparatus may be used on better class of structures; it is also used for swing sash. It may be operated from any point as specified.
oof Steel.
Clinch Rivet.

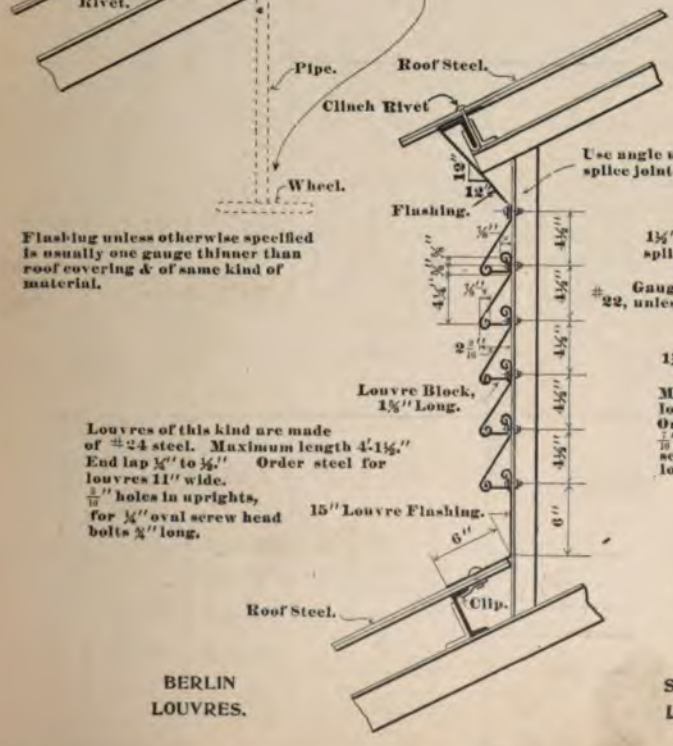
Flashing unless otherwise specified is usually one gauge thinner than roof covering & of same kind of material.


Ordinary length of shutter, 8'-0"
Flat or crimped steel.
1¼" x 1¼" x 5/16" L. Frame.
2'-4"
Fine corrugated steel.
1¾" x 1¾" x 5/16" L. Frame.
Usually 2'-0"

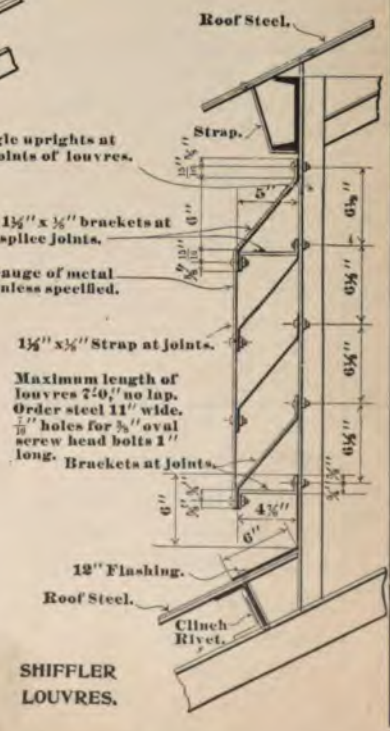
Section through Flat or crimped Steel shutter.

Section through Corrugated Steel shutter.

Flat or crimped steel #20 gauge & of same kind of material as roof unless noted. Ventilators with flat or crimped steel shutters, should have intermediate portions & ends covered with corrugated steel. Use standard corner cap. Vents with Cor. steel shutter, to be covered with regular Cor. steel same as rest of building.


Pipe.
Roof Steel.
Clinch Rivet
Wheel.
12"
12"
Flashing.
Use angle uprights at splice joints of louvres.
1⅜" x ⅛" brackets at splice joints.
Gauge of metal #22, unless specified.
Louvre Block, 1⅝" Long.
Louvres of this kind are made of #24 steel. Maximum length 4'-1⅛". End lap ¼" to ⅜". Order steel for louvres 11" wide. 5/16" holes in uprights, for ¼" oval screw head bolts ¾" long.
15" Louvre Flashing.
6"
6"
Roof Steel.
Clip.

BERLIN LOUVRES.



SHIFFLER LOUVRES.

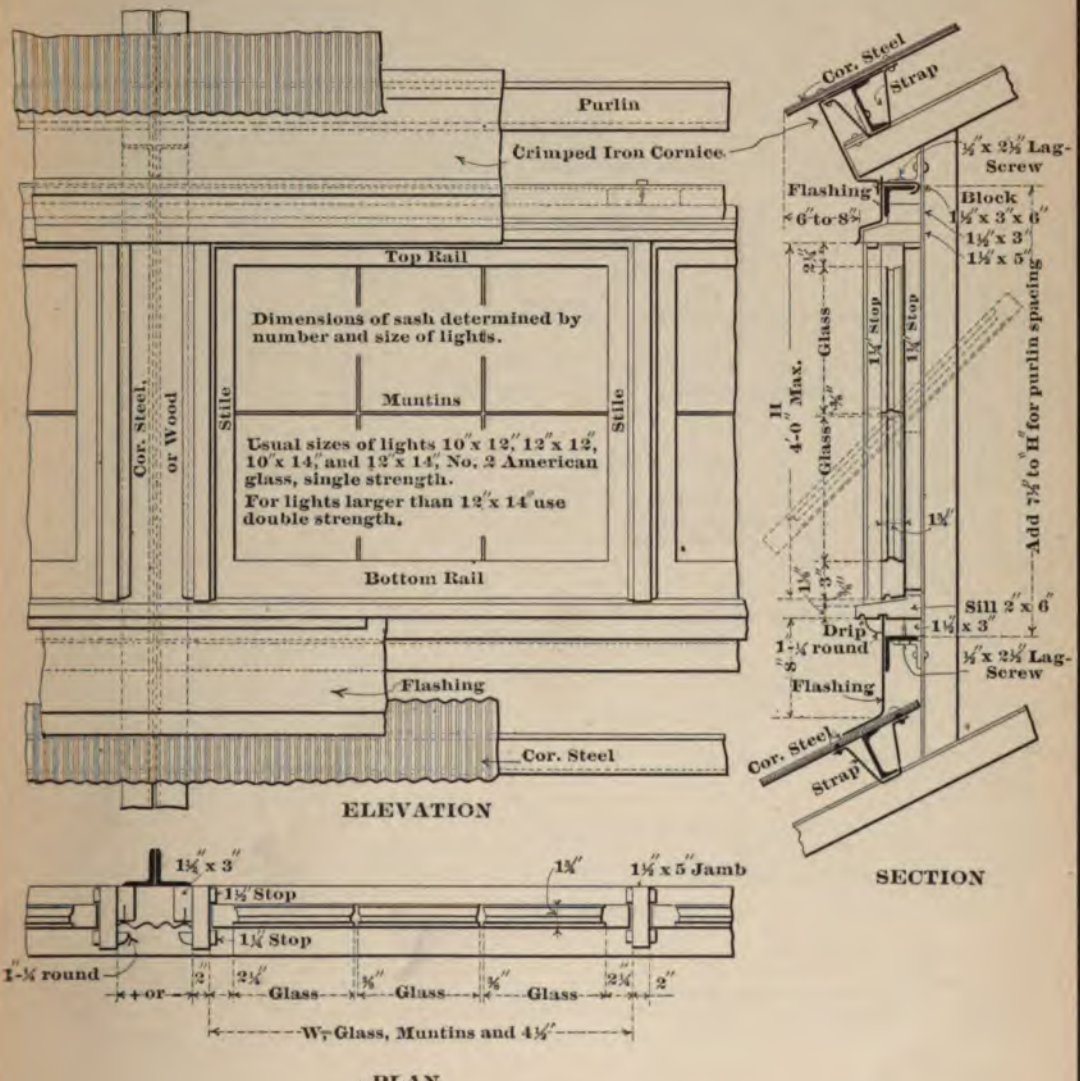
ORDINARY WINDOW SASH

Dimensions in feet and inches.

NO. OF LIGHTS	SIZE OF GLASS	WIDTH *W*	HEIGHT *H*	STYLE	STYLE	HEIGHT *H*	WIDTH *W*	SIZE OF GLASS	NO. OF LIGHTS
	10 x 12	2 - 11¼	2 - 5⅜			4 - 7½	2 - 11¼	10 x 12	
	12 x 12	3 - 5¼	2 - 5⅜			4 - 7½	3 - 5¼	12 x 12	
	10 x 14	2 - 11¼	2 - 9⅜			5 - 3½	2 - 11¼	10 x 14	
	12 x 14	3 - 5¼	2 - 9⅜			5 - 3½	3 - 5¼	12 x 14	
	10 x 16	2 - 11¼	3 - 1⅝			5 - 11½	2 - 11¼	10 x 16	
6	12 x 16	3 - 5¼	3 - 1⅝			5 - 11½	3 - 5¼	12 x 16	12
	14 x 16	3 - 11¼	3 - 1⅝			5 - 11½	3 - 11¼	14 x 16	
	10 x 12	2 - 11¼	3 - 6			6 - 8¼	2 - 11¼	10 x 12	
	12 x 12	3 - 5¼	3 - 6			6 - 8¼	3 - 5¼	12 x 12	
	10 x 14	2 - 11¼	4 - 0			7 - 8¼	2 - 11¼	10 x 14	
	12 x 14	3 - 5¼	4 - 0			7 - 8¼	3 - 5¼	12 x 14	
	10 x 16	2 - 11¼	*4 - 6			*8 - 8¼	2 - 11¼	10 x 16	
9	12 x 16	3 - 5¼	*4 - 6			*8 - 8¼	3 - 5¼	12 x 16	18
	14 x 16	3 - 11¼	*4 - 6			*8 - 8½	3 - 11¼	14 x 16	
	10 x 12	3 - 9⅜	2 - 5⅜			4 - 7½	3 - 9⅜	10 x 12	
	12 x 12	*4 - 5⅝	2 - 5⅜			4 - 7½	*4 - 5⅝	12 x 12	
	10 x 14	3 - 9⅜	2 - 9⅜			5 - 3½	3 - 9⅜	10 x 14	
	12 x 14	*4 - 5⅝	2 - 9⅜			5 - 3½	*4 - 5⅝	12 x 14	
	10 x 16	3 - 9⅜	3 - 1⅝			5 - 11½	3 - 9⅜	10 x 16	
8	12 x 16	*4 - 5⅝	3 - 1⅝			5 - 11½	*4 - 5⅝	12 x 16	16
	14 x 16	*5 - 1⅜	3 - 1⅝			5 - 11½	*5 - 1⅜	14 x 16	
	10 x 12	3 - 9⅜	3 - 6			6 - 8¼	3 - 9⅜	10 x 12	
	12 x 12	*4 - 5⅝	3 - 6			6 - 8¼	*4 - 5⅝	12 x 12	
	10 x 14	3 - 9⅜	4 - 0			7 - 8¼	3 - 9⅜	10 x 14	
	12 x 14	*4 - 5⅝	4 - 0			7 - 8¼	*4 - 5⅝	12 x 14	
	10 x 16	3 - 9⅜	*4 - 6			8 - 8¼	3 - 9⅜	10 x 16	
12	12 x 16	*4 - 5⅝	*4 - 6			8 - 8¼	*4 - 5⅝	12 x 16	24
	14 x 16	*5 - 1⅜	*4 - 6			8 - 8¼	*5 - 1⅜	14 x 16	

Note: Sizes marked thus have 1¼ sash.*

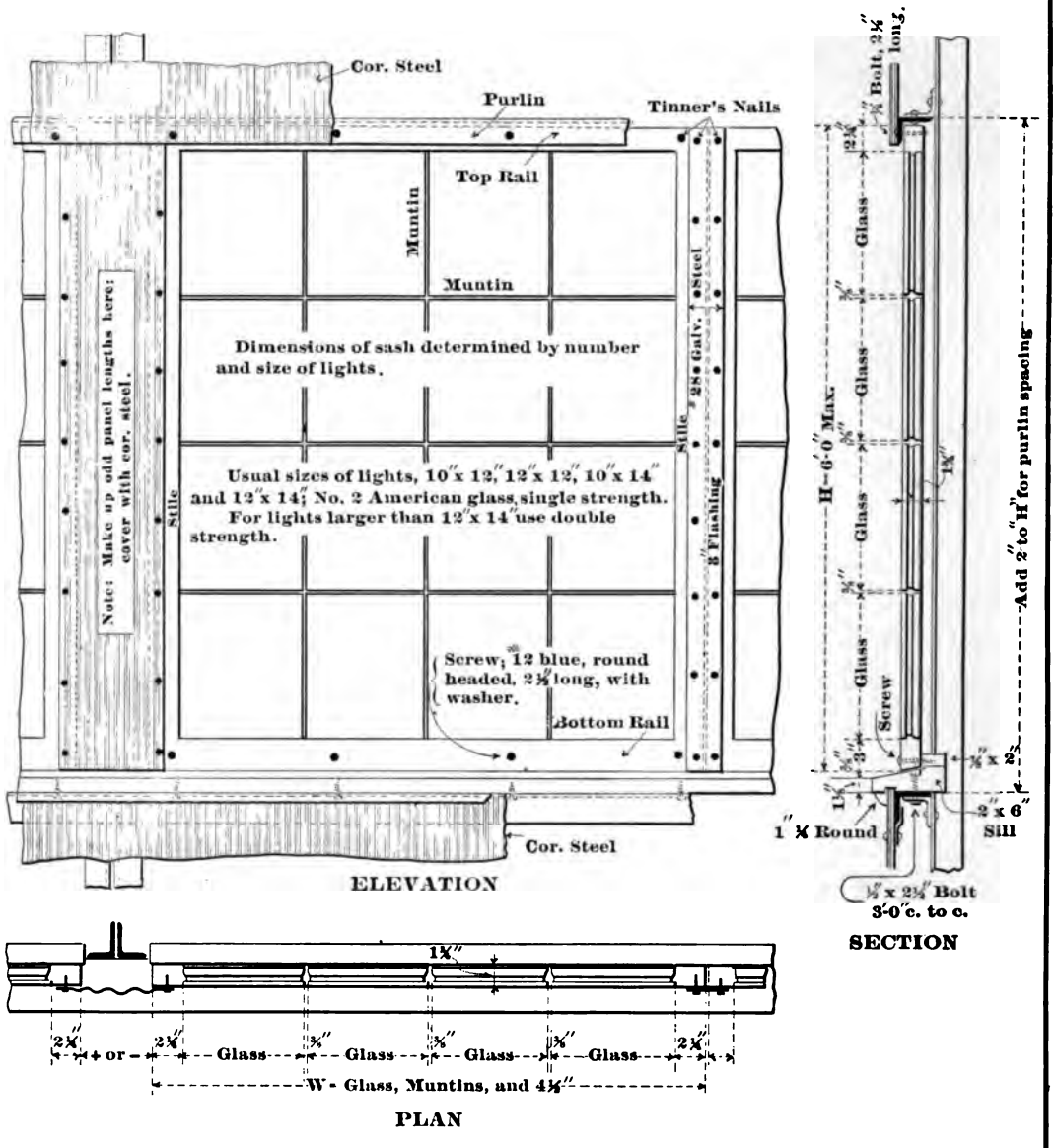
CONTINUOUS FRAMES AND SASH IN MONITOR.



Design shown is for fixed sash for monitor; for swing monitor sash, cut stops off as shown by dotted lines and omit head stop on inside.

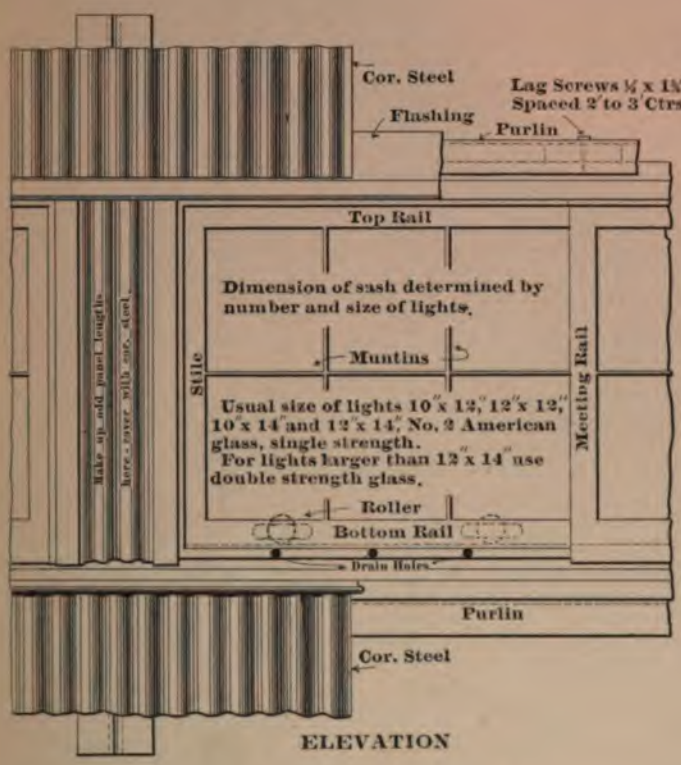
Make frames and sash of White Pine, excepting spiking and blocking pieces, which are to be of Spruce, Hemlock or Norway Pine, planed on all exposed sides. For swing sash order two trunnions for each sash, and call for lever operating device.

CONTINUOUS SASH

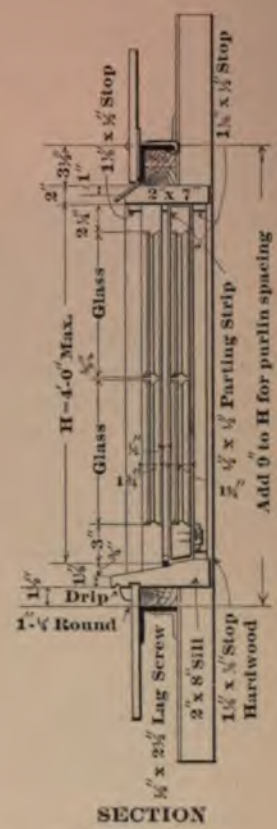


Design shown is for Continuous Fixed Sash in Cor. Steel sides. Make sash and sill of white Pine, planed on all exposed sides.

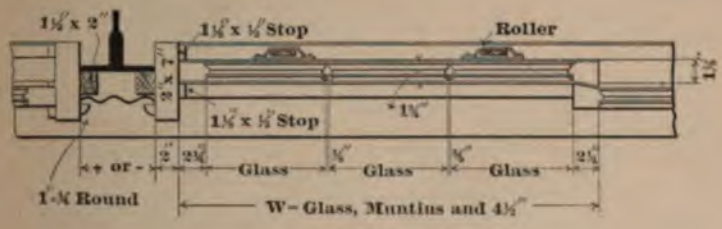
CONTINUOUS SLIDING SASH.


Cor. Steel
Lag Screws ½ x 1¾"
Spaced 2' to 3' Ctrs.
Flashing
Purlin
Top Rail
Dimension of sash determined by number and size of lights.
Muntins
Stile
Meeting Rail
Usual size of lights 10"x 12", 12"x 12", 10"x 14" and 12"x 14", No. 2 American glass, single strength.
For lights larger than 12" x 14" use double strength glass.
Roller
Bottom Rail
Drain Holes
Purlin
Cor. Steel

ELEVATION



SECTION



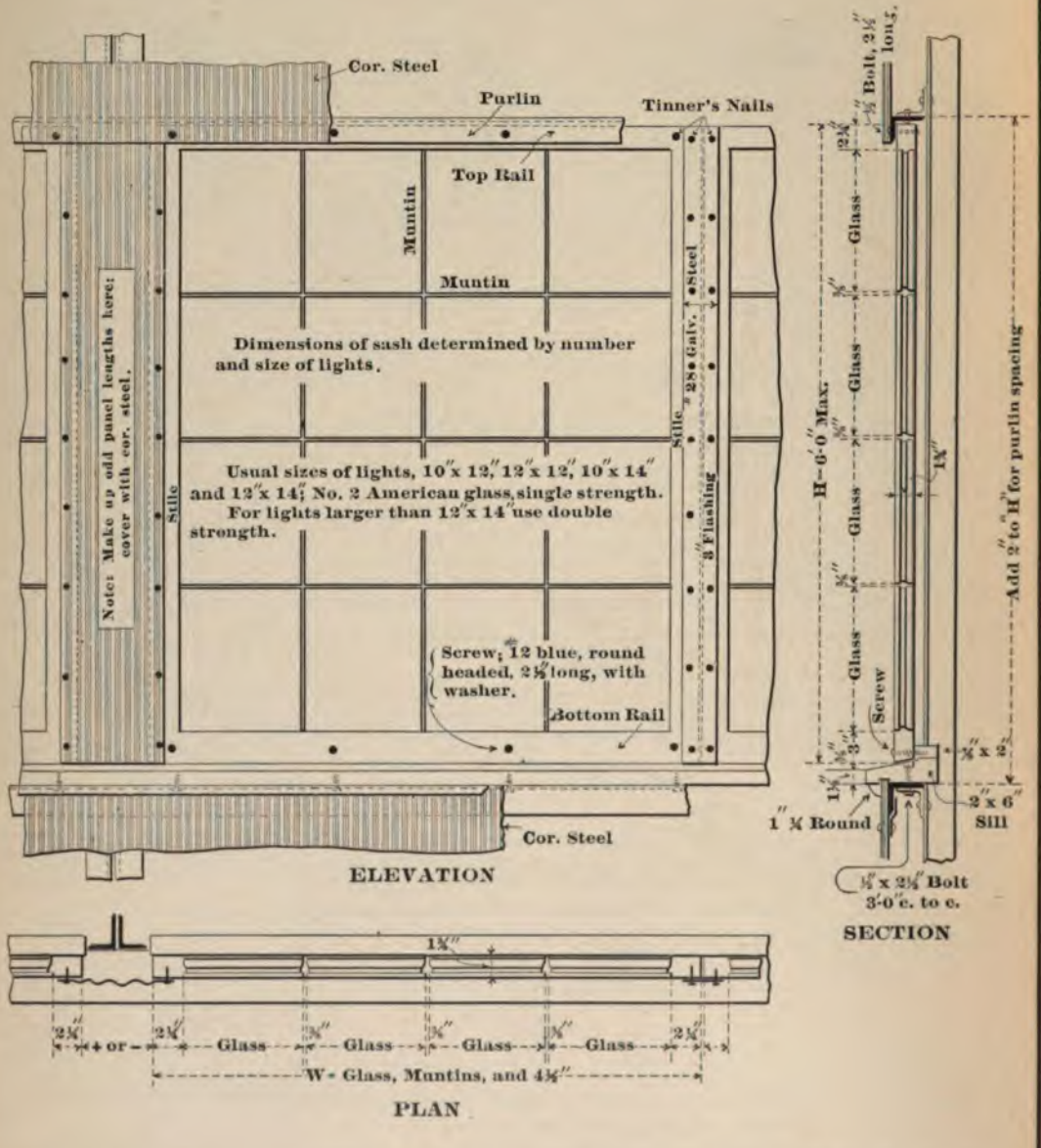
PLAN

Design shown is for sliding sash in corrugated steel sides.

Make frames and sash of white pine, excepting spiking and blocking pieces, which are to be of spruce, hemlock or Norway pine, planed on all exposed sides. The stop used for roller track, is to be hardwood.

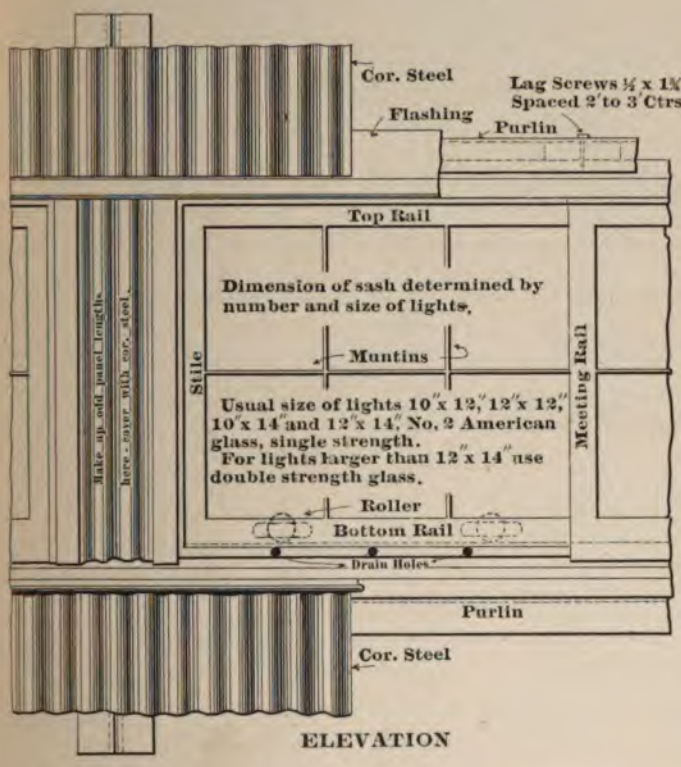
Call for operating device, as desired.

CONTINUOUS SASH

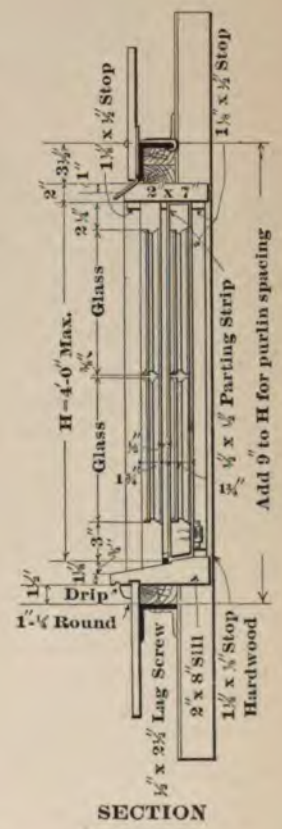


Design shown is for Continuous Fixed Sash in Cor. Steel sides. Make sash and sill of white Pine, planed on all exposed sides.

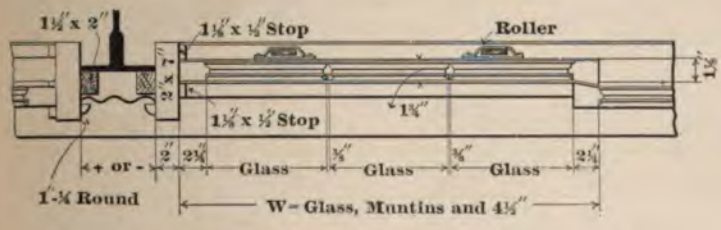
CONTINUOUS SLIDING SASH.


Cor. Steel
Lag Screws ½ x 1¾"
Spaced 2' to 3' Ctrs.
Flashing
Purlin
Top Rail
Dimension of sash determined by number and size of lights.
Muntins
Stile
Meeting Rail
Usual size of lights 10"x 12", 12"x 12", 10"x 14" and 12"x 14", No. 2 American glass, single strength.
For lights larger than 12" x 14" use double strength glass.
Roller
Bottom Rail
Drain Holes
Purlin
Cor. Steel
Make up odd panel lengths here - layer with cor. steel.

ELEVATION



SECTION



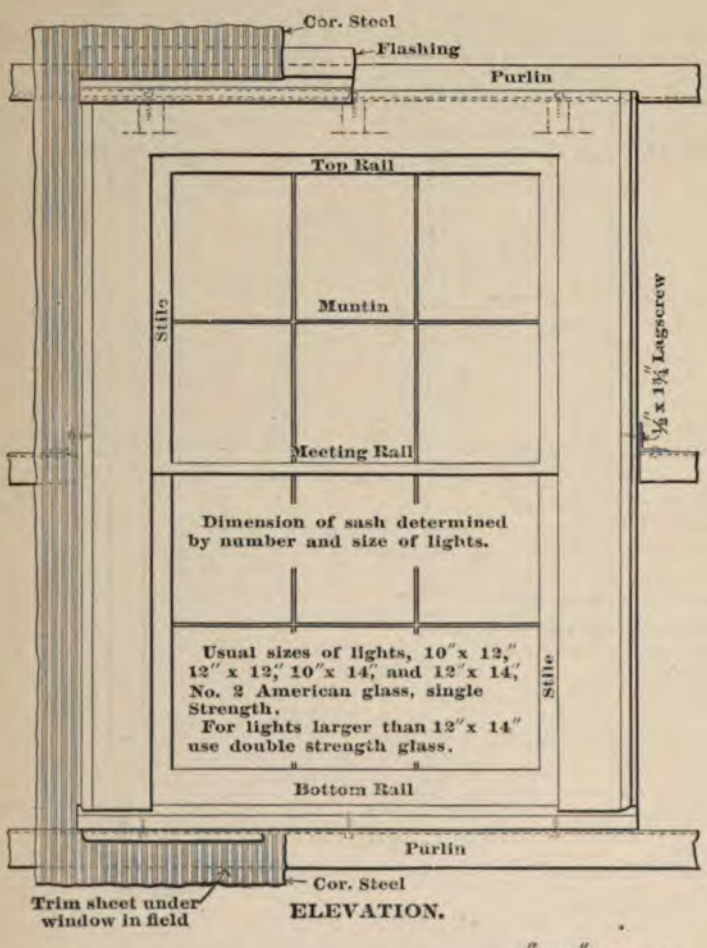
PLAN

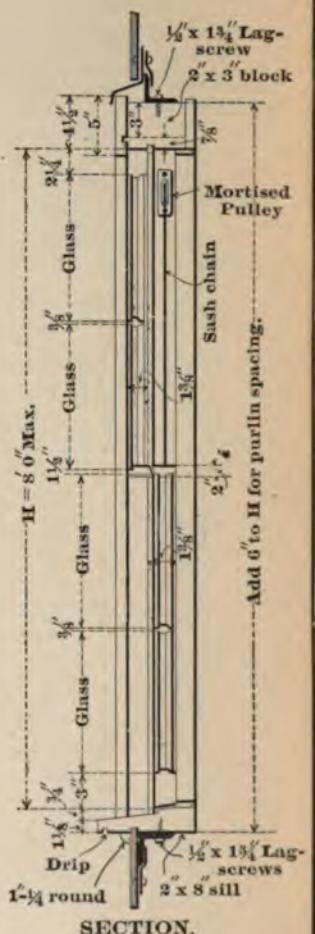
Design shown is for sliding sash in corrugated steel sides.

Make frames and sash of white pine, excepting spiking and blocking pieces, which are to be of spruce, hemlock or Norway pine, planed on all exposed sides. The stop used for roller track, is to be hardwood.

Call for operating device, as desired.

DOUBLE HUNG, WEIGHTED WINDOWS.


Cor. Steel
Flashing
Purlin
Top Rail
Muntin
Stile
Meeting Rail
½" x 1¾" Lagscrew
Dimension of sash determined by number and size of lights.
Usual sizes of lights, 10" x 12", 12" x 12", 10" x 14", and 12" x 14", No. 2 American glass, single Strength.
For lights larger than 12" x 14" use double strength glass.
Stile
Bottom Rail
Purlin
Cor. Steel
Trim sheet under window in field

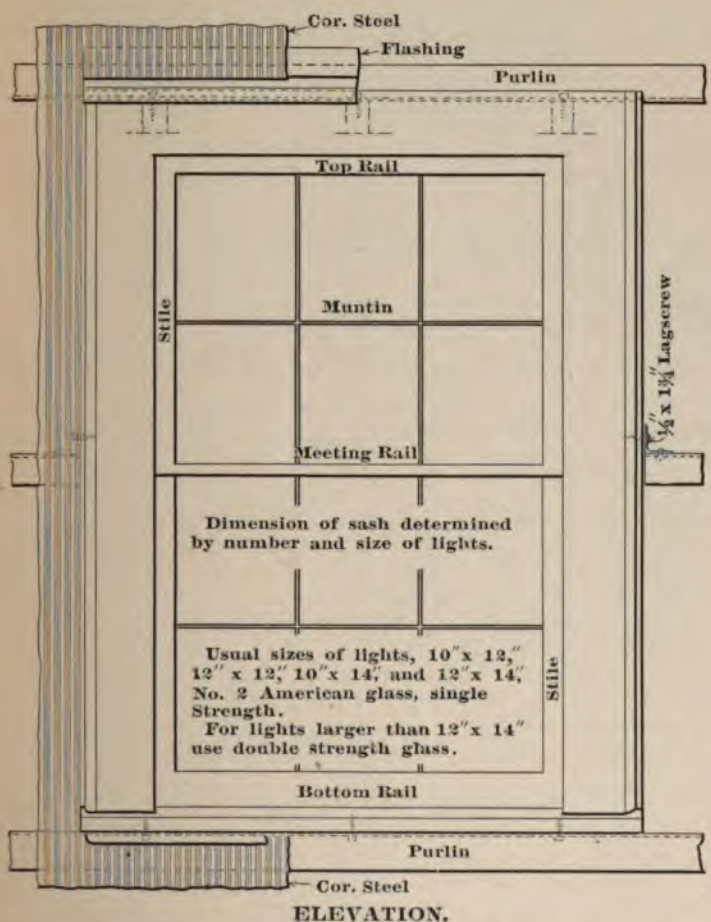
ELEVATION.

SECTION.

PLAN.

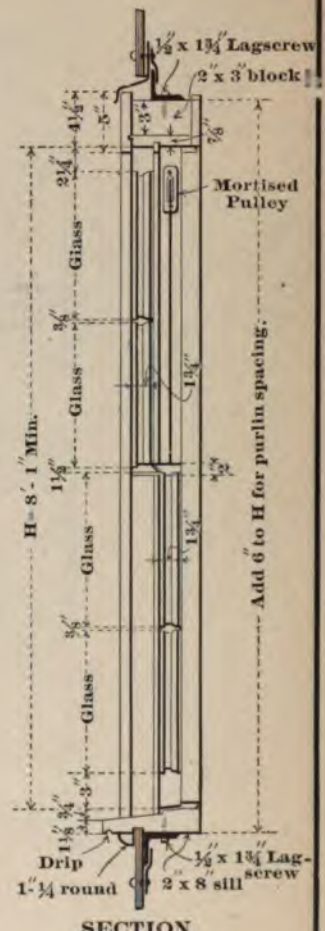
This design for sash having both dimensions not greater than 4'-0".

Design shown is for a window frame with double hung weighted sash in cor. steel siding. Make sill and casings of white pine; jambs and parting strips of hard pine; spiking pieces and blocks of Spruce, Hemlock or Norway Pine, planed on all exposed sides.

DOUBLE HUNG, WEIGHTED WINDOWS.


Cor. Steel
Flashing
Purlin
Top Rail
Stile
Muntin
Meeting Rail
½" x 1¾" Lagscrew
Dimension of sash determined by number and size of lights.
Usual sizes of lights, 10"x 12," 12" x 12," 10"x 14," and 12"x 14," No. 2 American glass, single Strength.
For lights larger than 12"x 14" use double strength glass.
Stile
Bottom Rail
Purlin
Cor. Steel

ELEVATION.



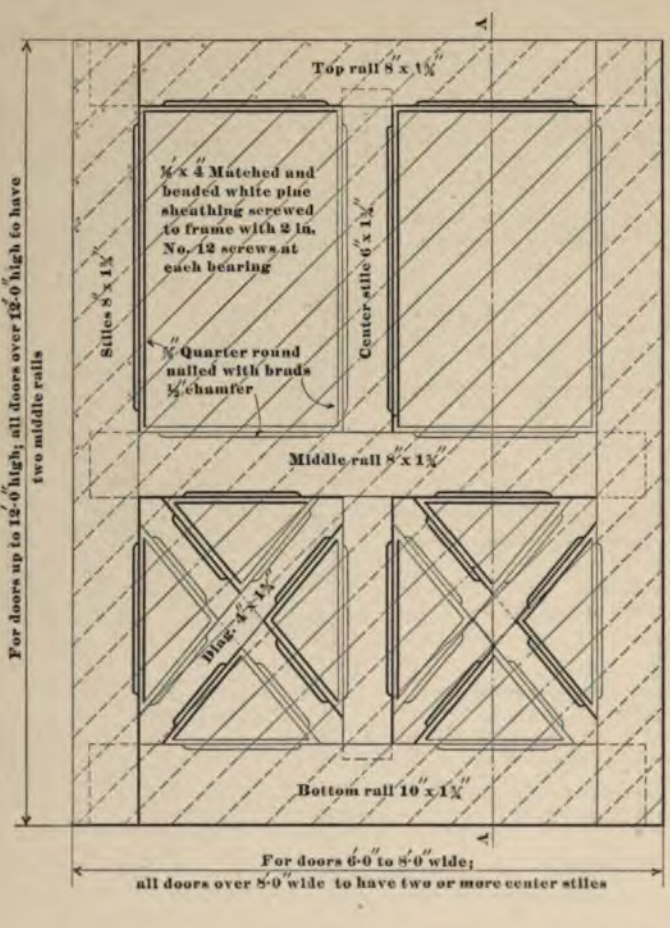
SECTION.

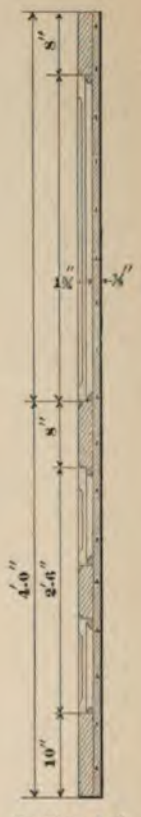
PLAN.

This design for sash having <u>one</u> dimension not less than 4'-1".

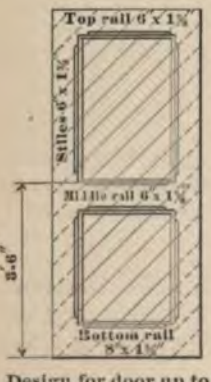
Design shown is for a window frame with double hung weighted sash in cor. steel siding. Make sill and casings of white pine; jambs and parting strips of hard pine; spiking pieces and blocks of Spruce, Hemlock or Norway Pine, planed on all exposed sides.

STANDARD DOOR


A
Top rail 8" x 1¾"
⅛" x 4" Matched and beaded white pine sheathing screwed to frame with 2 in. No. 12 screws at each bearing
Stiles 8" x 1¾"
Center stile 6" x 1¾"
¾" Quarter round nailed with brads
⅛" chamfer
Middle rail 8" x 1¾"
Diag. 4" x 1¾"
Bottom rail 10" x 1¾"
A
For doors up to 12'-0" high; all doors over 12'-0" high to have two middle rails
For doors 6'-0" to 8'-0" wide; all doors over 8'-0" wide to have two or more center stiles



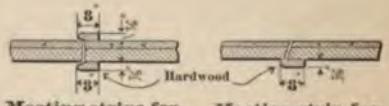
Section A-A



Design for door up to 3'-0" x 7'-0"

Top rail 6" x 1¾"
Where this dimension is over 3'-0" use center stile.
Stiles 6" x 1¾"
Middle rail 6" x 1¾"
Diag. 4" x 1¾"
4'-0"
Bottom rail 10" x 1¾"

Design for doors over 3'-0" x 7'-0" and up to 6'-0" wide



Meeting strips for double sliding doors. Meeting strip for double swing doors.

Doors may be either slide or swing. Sliding doors should be 4" wider and 2" higher than clear opening between jambs.
All doors under 6'-0" wide to have 1⅜" stiles and rails.
All doors over 6'-0" wide to have 1¾" stiles and rails.
All stiles and rails to be halved or mortised and tenoned together.
Doors to be made of white pine
If doors are to be covered with tin or sheet metal they are to be made of two or more thicknesses of ⅞" matched white pine sheathing not over 4" wide, laid diagonally and put together with wrought nails well clinched.

CORRUGATED SHEETING FOR BUILDINGS AND ROOFS.

Two kinds of corrugated sheeting are used in covering buildings—the flat, which is to be painted, and the galvanized. In the United States sheets both flat and corrugated are made by the mills to fulfil the standards, fixing the gage, thickness and weight per square foot, approved by act of Congress, March 3, 1893. They are as follows:

Gauge No.	Thickness in Inches.	Weight per square foot.			
		Flat Sheets.		Corrugated Sheets.	
		Black.	Galvanized.	Black, Painted	Galvanized.
16	.0625	2.50	2.66	2.75	2.91
18	.0500	2.00	2.16	2.20	2.36
20	.0375	1.50	1.66	1.65	1.82
22	.0313	1.25	1.41	1.38	1.54
24	.0250	1.00	1.16	1.11	1.27
26	.0188	0.75	.91	0.84	0.99
28	.0156	0.63	.79	0.69	0.86

The weights of corrugated in the above table are for the standard corrugations, 2½ inches wide approximately, and ⅛ of an inch deep.

Roofing.

The standard slope for roofs covered with corrugated sheeting is six inches to the foot. The sheeting should not be used on roofs having a slope of less than four inches to the foot, unless special provision be made to make laps tight. The sheeting is placed directly on

purlins spaced proper distances apart, or may be laid directly on wood sheathing, which covers the entire surface of the roof. When the corrugated sheeting rests on purlins, the gages commonly used are No. 20 and 22.

Siding.

Corrugated sheeting for siding of buildings is attached the same as roofing, directly to the purlins or nailed to wood sheathing. If purlins are used, the gages commonly specified are Nos. 22 and 24. One gage lighter being used for the siding than is used for the roofing for the same building.

Whenever possible, particularly for roofing, sheets should be arranged to span at least two purlin spaces.

Fastening for Corrugated Sheeting.

Various methods of fastening the corrugated sheeting to purlins on the sides and roofs of buildings are shown on the accompanying standard illustrations, pages No. 58 and 59, and in a general way is shown the different conditions under which the different methods of fastening should be employed.

Straps

Straps made of band steel ¾ inch wide are used to fasten the sheeting to purlins made of all the rolled shapes, but usually are to be applied for fastening the sheeting on roofs where channel, I Beam or Z-bar purlins are used. These straps pass around the purlins, and are riveted at both ends to the sheets, or they may be fastened by bolts specially made for such purpose. Two of these straps should be used for each sheet on each purlin, or practically 12 inches apart.

Clinch Rivets.

Clinch rivets are commonly used for attaching corrugated sheeting to angle iron purlins. These rivets are made of wire with a special head which fits the top of the

corrugation and, as indicated on pages Nos. 58, are put through the sheets close to the upper face of the angle purlin and clinched around its lower edge. The same fastening is used for siding where angle purlins or girts are employed. Three or four of these clinch rivets should be used for each sheet on each purlin or girt, spacing them practically 6 inches apart for roofing and 8 inches for siding.

Clips and bolts are used for fastening corrugated sheeting to channel, I Beam or Z-bar purlins, where straps or clinch rivets cannot be conveniently employed, or when steel sheeting is lined with an asbestos anti-condensation lining. The clips are made of flat steel, 1½ inches wide, about 2½ inches long, and are slightly crimped at one end to go over the flange of the purlin. Clips and Bolts.

One bolt is used on each clip, and this bolt is made of the same diameter of wire, and has the same head made to fit the top of the corrugations as the clinch rivets. These clips and bolts are spaced 6 inches and 8 inches apart, the same as the clinch rivets.

Edges of sheets where side laps are made are usually riveted every 12 inches.

All fastenings should be securely applied, and the sheeting brought to snug bearing on purlins and at all joints.

In all cases the bolts or rivets fastening the sheeting to the purlins or girts should go through the tops of the corrugations.

Flashing, Ridging, Capping and Cornices.

Flashing, ridging, capping and cornices should always be used to cover up the joints in sheeting, and make the structure weatherproof. Flashing, when used

where the slope in the sheeting changes direction, should be of sufficient dimension and so arranged that at least three inches vertical height is obtained between the edge of the flashing and the end of the corrugated sheeting. Vertical seams of all flashing should be closely riveted, and the horizontal edges of the flashing should be securely riveted to the corrugated roof or side sheeting.

Ridging

Ridging should be placed covering the apex of all roofs, and where buildings are of ordinary size standard ridge roll should be used.

Corner Capping.

Corner capping is either bent, plain edge flat steel, or bent flat steel, with the edges terminating in a small scroll to keep the capping well in line, or corrugated sheeting may be turned around the corners neatly, thus closing up the opening where the two vertical surfaces join.

Cornices

Cornices along the eaves and the gable ends of buildings may be finished in various ways. The two usual methods employed for both eaves and gable ends are shown on pages No. 58, 59 and 60. If desired, a molded cornice can be used, made of such a form to fit the projection of the purlins, and of dimensions commensurate with the size and character of the building.

Gutters and Conductors.

Gutters and conductors are made of various dimensions, styles and forms. Three eave gutters in common use are sketched on page No. 58. Conductors are made of plain sheets with round cross-section, and corrugated of either round or rectangular cross-section. The round conductors are more commonly used.

Ventilators.

Openings in ventilators may be fitted with shutters, sash, or with louvers.

Shutters

Shutters are made of angle iron frames covered either with flat, crimped or corrugated sheets. These shutters are hinged at the top, and may be operated by a straight lever device, by means of cord and spring, or operated by means of any of the worm gear toggle arrangements which are commonly used in various localities for such purposes. Any device which will easily open and close the shutter, and at the same time securely hold it in any position in which it may be placed, will fulfil the required conditions.

Louvers

Louvers are usually made in two different ways. The louver shown on page No. 60 as the Shiffler Louver is one which is commonly used in the Pittsburg District, while the other form, known as the Berlin Louver, has been used in the East.

Tubular Ventilators.

Tubular ventilators of various kinds are often employed in place of monitors for roof ventilation. These tubular ventilators are made of various dimensions, of galvanized or other sheet metal, and are usually placed along the ridge line of the roof. For proper ventilation of the building, it is customary to estimate that one square foot of ventilator area will ventilate 300 to 400 square feet of floor area, depending on the character of building to be ventilated.

Skylights.

When skylights are placed in roofs of structures, two types are used:

Box Skylights.

Box skylights covering a small area are placed in the slope of the roof at proper intervals. These are placed on a curb raising the glass above the roof line.

Continuous Skylights.

Continuous skylights are made in an extended strip of a width sufficient to properly light the building interior. These are placed in the slope of the roof, preferably at the ridge.

Ribbed glass is used extensively for skylight work in thicknesses varying from ¼ inch to ⅜ inch. The glass is supported by steel bars, either solid special rolled sections, or made of sheet metal properly formed to receive the glass. The supporting bars are spaced about 20 inches apart, to suit the sheets of the glass, which comes in sheets about 20 inches wide, and not more than 8 feet long.

Doors and Windows.

Doors.

Steel doors for corrugated steel buildings are made by covering an angle iron frame with corrugated sheeting, usually the same quality as the building siding.

Fireproof doors are sometimes constructed of two or more thicknesses of matched pine sheathing, covered on both sides with flat sheet steel or tin.

Wood doors are usually constructed of matched pine sheathing fastened to a well built frame, as shown in the details on page No. 69. Stock wood doors up to 3 feet wide can be procured of manufacturers, and are usually made of white pine with molded panels. Small

single doors up to 4 feet wide should be detailed to swing on hinges, and large doors, both single and double, should be arranged to slide sidewise on overhead trolley tracks with adjustable hangers, or to lift upwards between vertical guides, counterbalanced by weights attached to ropes passing over sheaves.

Doors should be detailed to suit the conditions they are to fill, and the openings they close.

Windows.

The different types of windows ordinarily used in the sides of buildings, constructed with corrugated sheet siding, are shown on pages No. 61 to 68. The sash and frames are constructed of white pine, and the glazing is usually No. 2 or A quality, American glass, single or double strength, depending on the size of the lights. The sizes of glass commonly used are 10 inches by 12 inches, 12 inches by 12 inches, 10 inches by 14 inches and 12 inches by 14 inches lights.

In the sides of buildings where light is to be obtained and no ventilation desired the continuous fixed sash is used. See page No. 63.

If a maximum amount of light is desired and ventilation is to be obtained, the continuous sliding sash can be used. See page No. 64. This detail allows one-half of the window area to be opened.

In the sides of monitors and sometimes in the sides of buildings, swing sash are used. See page No. 62. These should be carefully made and fitted, and operated by a device that will hold them securely in any position.

Two kinds of single windows with two sash each are shown by the sketches.

One is the Counterbalanced Window, where one sash balances the other. See page No. 65. 66. Two sizes are shown varying by thickness of sash for two sizes of windows.

Another is the Double-Hung Weighted Window, where each sash is balanced by weights, also arranged for two sizes of openings. See page No. 67 to 68.

The styles of windows shown on illustrations. will fulfil all the requirements desired for ordinary factory or mill building construction. For windows in brick walls the frames need only to be modified slightly to suit the usual details for brick work.

Corrugated Steel Arches.

Curved or arched corrugated sheets are used for arches between rolled beams, forming a support for concrete filling. The steel is ordinarily the standard 2½ inch corrugation, and gages are Nos. 16, 18, and 20, depending on the superimposed load and the length of span. The rise of the arch should not be less in inches than the span in feet, and should be determined by the depth of beam supports and the thickness of material allowed over crown of the arch, varying from 2 to 4 inches. Beams are spaced for this construction from 4 to 7 feet apart.

RULES

...for...

MAKING SHOP DRAWINGS.

Size of Sheet.

The standard size of sheet shall be 24 by 36 inches, with two border lines ½ and 1 inch from the edge respectively. See page 49.

Small sheets shall be used for beams, pins, eye-bars, etc. Special forms are provided for these sheets.

Title.

The title shall be arranged uniformly for each contract near the lower right-hand corner of the sheet. See pages Nos. 49 and 51.

A stamp is provided for the contract, sheet number, etc. It shall be applied in the lower right-hand corner of the sheet. The name of the draughtsman in charge of the work shall appear in full, others with initials only. See page No. 49.

Scale.

Detail drawings shall as a rule be made in scale ¾ or 1 inch to the foot; for large plate and lattice girders ½ and ⅜ inch may be used. Larger scales, such as 1½ and 3 inches to the foot, are permissible only for showing certain complicated details or for machine work.

General Rules.

Large sheets shall be neatly and carefully made to exact scale.

Members shall be detailed in the position which they occupy in the structure, *i. e.*, horizontal members shall

be shown lengthwise, and vertical members crosswise on the sheet. Inclined members (and vertical ones when necessary on account of space) may be shown lengthwise on the sheet, but then always with their lower end to the left.

Avoid notes as much as possible. Where there is the least chance for ambiguity make another view.

Show all elevations, sections and views in their proper position—looking *toward* the member. Place the top view directly above and bottom view below the elevation. The bottom view shall always consist of a horizontal section seen from above.

In sectional views the web or gusset plates shall always be blackened. Angles, fillers, etc., shall be cross-hatched, but only when necessary on account of clearness. In a plate girder for instance, it is not necessary to cross-hatch *all* the stiffeners and fillers in the bottom view.

Holes for field connections shall always be blackened, and shall, as a rule, be shown in all elevations and sectional views. Rivet heads shall be shown only when necessary; f. i., at the ends of members, around field connections, when countersunk, flattened, etc., etc.

In detailing members which adjoin or connect to others in the structure, part of the latter shall be shown in red, sufficiently to indicate the clearance required or the nature of the connection. Plain building work is exempt from this rule.

When part of one member is detailed same as another, figures for rivet spacing, etc., shall not be repeated; refer to previous sheet or sheets, bearing in mind that these must contain final information. It is not permissible to refer to a sheet, which in turn refers to

another. Main dimensions, which are necessary for checking, such as c. to c. distances, story heights, etc., shall be repeated from sheet to sheet.

Holes for field connections must always be located independently, even if figured in connection with shop-rivets; they shall be repeated from sheet to sheet unless they are standard, in which case they shall be identified by a mark and the sheet given on which they are detailed.

A diagram in small scale, showing the relative position of the member in the structure, shall appear on every sheet. The member or members, which are detailed on the sheet, shall be shown in black, and the rest in red ink. Plain building work is exempt from this rule.

The quality of material, workmanship, size of rivets, etc., shall be specified on every sheet as far as it refers to the sheet itself. Standard workmanship, such as milling and tight fit of stiffeners, milling ends of columns, etc., etc., shall not be specified on drawings.

Marking System.

Each piece which is shipped separately shall have a shipping mark. These marks shall consist of capital letters and numerals, or numerals only; no small letters shall be used except when sub-marking becomes absolutely necessary. The letters R. and L. shall be used only to designate "right" and "left." Never use the work "marked" in abbreviated form in front of the letter, f. i., "3 Floorbeams, mk. G4;" say "3 Floorbeams G4."

Pieces which are shipped bolted on to a member shall, as a rule, also have a separate mark in order to identify them should they for some reason or another become detached from the main member. The drawing

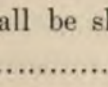
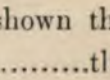
shall specify which pieces are to be bolted on for shipment, and the necessary bolts shall be billed.

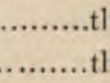
A system of assembling marks shall be established for all small pieces in a structure which repeat themselves in great numbers. These marks shall consist of small letters and numerals or numerals only; no capital letters shall be used; avoid prime and sub-marks, such as m'a.

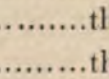
Lettering. For all lettering use plain letters, see pages Nos. 49 to 57. For title, main dimensions and for all marks, particularly shipping marks, use heavy type. Red ink (Winsor & Newton's Carmine) shall be used for dimension, reference lines, etc.

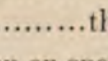
Conventional Signs. Conventional signs for rivets are shown on page No. 18. Countersunk rivet heads project $\frac{1}{8}''$; if less height of heads is required, drawings shall specify that they are to be chipped, or that they must not project more than $\frac{1}{16}''$.

Flattened heads project from $\frac{3}{8}''$ to $\frac{7}{16}''$; if less height of heads is required, they shall be countersunk.

Steel in section shall be shown thus,  or 

Cast-iron.....thus, 

Cast-steel.....thus, 

Phosphor bronze or brass.....thus, 

Shop Bills. Shop bills shall be written on special forms provided for the purpose. When the bills appear on the drawings as well, they shall either be placed close to the member to which they belong or on the right hand side of the sheet.

When the drawings do not contain any shop bills, these shall be so written that each sheet can have its bills attached to it, if desired; *i. e.*, one page of shop bills shall not contain bills for two sheets of drawings.

In large structures, such as Elevated Railroads, Viaducts, etc., which always are subdivided into shipments of suitable size, both mill and shop bills must be written separately for each shipment.

In writing the shop bill, bear in mind that it shall serve as a guide for the laying out and assembling of the member, besides being a list of the material required. For this reason members which are radically different as to material shall not be bunched in the same shop bill, neither shall pieces which have different marks be bunched in the same item, even if the material is the same.

The main material in a member shall be billed first, followed by the smaller pieces. It is generally a good practice to begin at the left end of a girder, or at the bottom of a post or column. Do not bill first all the angles and then all the flats; when f. i. the end stiffeners in a girder are billed, the fillers belonging to them shall follow immediately after the angles, and so on. In a column each different bracket shall be billed complete by itself.

When machine-finished surfaces are required, the drawing and the shop bill shall specify the finished width and length of the piece, proper allowance for shearing and planing being made in mill bill. When the metal is to be planed as to thickness, the drawing and shop bill shall specify both the ordered and the finished thickness, f. i., one pl. 12″ x $\frac{13}{16}$″ x 1′ 6″ planed to $\frac{3}{4}$″.

Flats and universal plates over 4″ in width should be ordered in even inches; flats under 4″ should be ordered by $\frac{1}{2}$″ variation in width. Flats $\frac{1}{4}$″ and under in thickness are very difficult to secure from the mills, and should be avoided if possible.

Sub-Divisions.

Every contract embracing different classes of work shall have a subdivision for each class. These subdivisions will be furnished by the Ch. Eng. of the district. Drawings, shop and shipping bills must be kept separate for each division.

Plate Girder Bridges.

General Rules.

As soon as a plate girder span is taken in hand, it shall be laid out in regard to location of web splices, stiffeners, coverplates, and in a through span, floor-beams and stringers, so that the material can be ordered at once if required.

Locate splices and stiffeners with a view of keeping the rivet-spacing as regular as possible; put small fractions at end of girder.

Stiffeners, to which cross-frames or floor-beams connect, must not be crimped, but shall always have fillers. The outstanding leg shall not be less than 4″, guaged 2½″; this will enable cross-frames or floor-beams to be swung in place without spreading the girders.

The second pair of stiffeners at the end of girder over the bed-plate shall be placed so that the plate will project not less than 1″ beyond the stiffeners.

Always endeavor to use as few sizes as possible for stiffeners, connection plates, etc., and avoid all unnecessary cutting of plates and angles. For this purpose locate end holes for laterals and diagonals so that they can be sheared in a single operation.

In spans on a grade, unless otherwise specified, put the necessary bevel in the bed-plate and not in the base-plate.

In short spans, say up to 50 feet, put slotted holes for anchor-bolts in both ends of girders.

In square spans show only one-half, but give all main dimensions for whole span.

In skew spans show whole span; when panels in one-half of span are same as in other half, give the lengths of these panels, but do not repeat rivet-spacing, except where it differs.

In the small scale diagram, which shall appear on every sheet, unless span is drawn in full, show the position of stiffeners, particularly those to which cross-frames or floor-beams connect.

Deck Spans

On top of sheet show top view of span, with cross-frames, laterals and their connections complete, the girders placed at right distance apart.

Below this view show the elevation of the far girder seen from inside, with all field holes in flanges and stiffeners indicated and blackened.

At one end of the elevation show in red the bridge-seat and back wall, give figures for distance from base of rail to top of masonry, notch of ties, depth of girder, thickness of base-plate and of bed-plate or shoe. When the other end of girder has a different height from base of rail to masonry, give both figures at the one end, and specify "for this end" and "for other end."

If span has bottom lateral bracing, a bottom view (horizontal section) shall be shown below the elevation.

When no bottom laterals are required, show only end or ends of lower flange of girder, giving detail of base-plate and its connection to the flange. Detail the

bed-plate separately, never show it in connection with the base-plate.

Cross-frames shall, whenever possible, be detailed on the right hand of the sheet in line with the elevation. The frame shall be made of such depth as to permit it being swung into place without interfering with the heads of the flange-rivets in the girders. Always use a plate, not a washer with one rivet, at the intersection of diagonals.

In skew spans it is always preferable to have an even number of panels in the lateral system.

Through Spans. Show on top of sheet an elevation of the far girder, seen from inside; below this view show a horizontal section of span, seen from above with lateral system detailed complete. It is generally best to show floor-beams and stringers in red in this view and detail them on a separate sheet.

The stiffeners in a through span should always be arranged so that the floor system can be put in place from the centre towards the ends.

What is said under "deck spans" about showing bridge-seat, back wall, detailing bed-plate separately, etc., applies to through spans as well.

Truss Bridges.

General Rules. Before any details are started all c. to c. lengths of chords, posts, diagonals, etc., shall be determined, and sketches made of shoes, panel-points, splices, etc., so that the material can be ordered as soon as required.

If not otherwise specified, camber shall be provided in the top chord by increasing the length ⅛″ for every 10 feet. This increase in length shall not be considered in figuring the length of the diagonals, except in special cases, as directed by the engineer in charge. Half the increase in length shall be considered in figuring the length of top laterals.

Particular attention must be paid to what is said under "General Rules," on page No. 79, about showing part of adjoining member in red, and about small scale diagram on every sheet.

For every truss bridge an erection diagram shall be made on a separate sheet, giving the shipping marks of the different members and all main dimensions, such as c. to c. trusses, height of truss, number and length of panels, length of diagonals, distance from base of rail to masonry, from centre of bottom chord or pin to masonry, etc., etc. Give further size and number of bars in bottom chord and diagonals, size and grip of pins, and show in larger scale the packing at panel points. State also any special feature which the erector needs look out for, and give approximate weight of heavy and important pieces when their weight exceeds five tons. If in any place it is doubtful whether rivets can be driven in the field, the erection diagram and also the detail drawings shall state that "bolts may be used if rivets cannot be driven." A list giving number and contents of drawings belonging to the bridge shall also appear on the erection diagram sheet.

Lattice Bridges

In square spans, not too large, show the left half of the far truss, seen from inside, and detail all members in their true position, making the skeleton one-half the scale of the details.

In skew spans, not symmetrical, show the whole of the far truss.

In large spans detail every member separately. When detailing web members bear in mind that the intersection point on the chord must not be used as a working point for a member which stops outside of the chord. A separate working point, preferably the end rivet, must be established on the member proper, and tied up with the intersection point on the chord.

The clearance between the chord and a web member entering same shall, whenever possible, not be less than $\frac{1}{8}''$ in heavy and $\frac{1}{16}''$ in light structures.

Members shall be marked with the panel points between which they go, f. i., End post LO–U1; 1st post L1–U1; top chord U1–U3, etc., etc. See diagram, page No. 50.

Pin-connected Bridges.

In pin-connected bridges detail the left half of the far truss, every member by itself. It is generally best to commence with the end post, showing it lengthwise on the sheet with the lower end to the left, then the first section of the top chord, and so on.

The packing at panel points shall, whenever possible, be so arranged that, besides the customary allowance of $\frac{1}{16}''$ for every bar, a clearance of not less than $\frac{1}{8}''$ can be provided between the two sides of the chord. When more than two pin plates are used, $\frac{1}{32}''$ should in addition be allowed for each plate.

Members shall be marked same as for lattice bridges, with the panel points between which they go, except the posts, which are best marked with letters and numerals. See diagram, page No. 50.

Office Buildings. Factories and Warehouses.

Numbering of Sheets.

The different sheets shall be numbered consecutively, whether large or small. No half numbers are permissible except in emergency cases. It is always well to arrange the numbers so that the sheets follow in the order in which the material is required at the building. The following is generally a good order:

Floor Plans for all floors,
Column Schedule,
Cast-iron Bases for Columns,
Foundation Girders,
" Beams,
First tier of Columns,
Riveted Girders, connecting to first tier of Columns,
Beams " " " " " "
Miscellaneous material for above,
Second tier of Columns, etc., etc.

Floor Plans.

Floor plans shall, as a rule, be made in scale $\frac{1}{8}$" to the foot, see page No. 53. A separate plan shall be made for each floor, unless they are exactly alike.

Columns shall be marked consecutively with numerals, the word Col. always appearing in front of the numeral, f. i., "Col. No. 20." The architect or engineer has generally on his drawings adopted a system of marking for the columns, which should be adhered to, unless altogether too impracticable.

Riveted girders shall be indicated with two (2) fine lines when they have cover plates, and with four (4) fine lines when they have no cover plates. They shall be marked consecutively with numerals, using same marks for girders which are alike.

Beams and channels shall be indicated with one single heavy line. They shall be marked same as girders, with numerals, using same marks when alike.

Tie rods shall be indicated with one single fine line; they need not have any marks.

The marking system shall be as uniform as possible for the different floors, *i. e.*, a beam which goes between columns No. 2 and No. 3 shall be marked with the same numeral throughout all the floors.

All figures necessary for making the details shall, as a rule, appear on the floor plan, care being taken in writing same to leave room for the erection marks, which must be printed in heavy type above the line or lines representing a beam or girder.

Column Schedule.

For every large building a schedule of the columns shall be made before the details are started. See page No. 52.

Each column, even should several be alike, shall have a separate space, in which shall be given the material and finished length.

As soon as the detail drawings for one tier of columns are finished the sheet numbers shall be inserted as shown on sample schedule, making the schedule serve as an index for the column drawings.

Columns.

Columns shall, whenever possible, be drawn standing up on the sheet as they appear in the building. If it becomes necessary to draw them lengthwise on the sheet, the base shall be to the left.

Particular attention shall be paid to establishing a marking system for brackets, splice-plates, etc. A summary of all these standard pieces shall be made for each tier and sent to the shop as early as practicable, in order that they may be gotten out before the main material is

taken up. The material for the small pieces shall, as far as possible, be chosen from stock sizes.

Columns shall be marked with the number of the floor between which they go; f. i., Col. No. 4 (1–3). The lower tier is best marked "Basement Tier."

Riveted Girders.

Girders shall be marked with the number of the floors, not with letters, unless specially requested; f. i., "2d Floor, No. 5."

What is said under columns about marking system for standard pieces applies to girders as well.

When a girder is unsymmetrical about the centre line, and a question may arise how to erect it, one end of the same shall be marked with the number of the column to which it connects, or with North, South, East or West.

Girders must not be bunched together for the different floors more than to meet the requirements in the field; *i. e.*, they must correspond to the tiers of columns as they will be erected.

Beams.

Beams shall be drawn on the standard forms provided for the purpose, see pages Nos. 54 to 57. They need not be drawn to scale; neat freehand sketches being allowed—in fact, desirable, where it will facilitate the rapid completion of the drawing without *sacrificing clearness.*

Beams shall be marked same as girders with the number of the floor; f. i., One 12″ x 40 lbs. I x 19′–3½″, Mark 2d Floor No. 35.

What is said under girders about marking one end, when not symmetrical around centre line, and about not bunching the different floors more than to meet the requirements in the field, applies to beams as well.

Whenever possible use standard framing angles.

If it is deemed necessary to use 6″ x 6″ angles, punch both legs same as 6″ leg of standard; in 3½″ x 3½″ or 4″ x 3½″ angles, punch both legs same as 4″ leg of standard. It is not absolutely imperative that the gauge of the framing angles shall be standard as long as the vertical distance between the holes and in the 6″ leg the horizontal distance (2¼″), is kept standard.

Holes for connections, tie-rods, etc., shall be located from one end of the beam, preferably the left. If one end rests on the wall and the other end is framed, then figure from the latter end, be it right or left. This rule may be dispensed with in case of numerous holes regularly spaced in web or flange for connection of shelf-angles, buckle-plates, etc.

The allowed overrun at ends of beams must always be indicated, either by giving figures or by showing wall bearing.

Holes at end of beam for anchors are best figured from wall end, not connecting them with other figures.

The distance between end holes in beams which connect through web or flange to columns, girders, etc., shall always be given.

When framing angles are standard, do not give any figures for either shop or field rivets, except the distance from bottom of beam to centre of connection or to first hole in framing angle, and the horizontal distance between field holes.

When special framing angles are used, the fact must be noted and figures given for gauges, etc.

For standard connection holes in web of beam all figures required are the distance from bottom of beam to centre of connection or to first hole and the horizontal distance between holes. Whenever possible use standard punching as given on pages Nos. 9 and 10.

APPENDIX

TO

RULES FOR MAKING SHOP-DRAWINGS.

Two methods may be employed in making shop-drawings for trusses in Mill Buildings or other structures, and for lattice girders in bridges.

The First Method is to make the drawings so complete (see previous rules) that the templets can be made for each individual piece separately on the bench.

The Second Method is to give on the drawings only sufficient dimensions to locate the interior of the member and the position of all pieces, leaving the details to be worked out by the templet-maker on the laying-out floor.

Sufficient figures should be given to definitely establish the main laying-out points; generally these figures should be those locating the outside dimensions of the chord of a truss, the end depths or such heights as may be necessary to establish the general outside lines of the complete member.

The interior pieces should be located by centre-lines corresponding to the gage lines of angles, or the centre of gravity lines of the pieces, as the case may be.

The rivet-spacing should be given complete for all connections to members not shown on the same sheet, in places where it becomes necessary to indicate clearance on opposite flanges, and for any connections which may be readily located from fixed points without employing any computation.

All other rivet-spacing, such as the connections of web pieces

to gussets, and the lengths of interior pieces, may be indicated by scale, leaving the actual location of the rivets to be determined by the templet-maker. The drawing should, however, indicate the number of rivets to be used in each individual connection, and should also state the usual rivet pitch to be employed for the work shown on the sheet, as well as the minimum rivet-spacing allowed.

No definite rule can be laid down as to which method should be employed; but in general straight work, such as columns, plate girders, heavy lattice girders in buildings and chords, floor beams, and stringers in highway bridges, should be laid out by the first method.

All roof trusses, light lattice girders and complicated work, such as towers, domes, hips and light lattice struts, should be laid out by the second method.

Before deciding which of the two methods should be employed in any individual case, the templet-maker should be consulted as to the facilities for undertaking the work, as lack of floor space in his shop may prevent the use of the second method.

Points to be Observed in Order to Facilitate Erection.

The first consideration for ease and safety in erection should be to so arrange all details, joints and connections that a structure may be connected, made self-sustaining and safe in the shortest time possible.

Entering connections of any character should be avoided when possible, notably on top chords, floor beam, and stringer connections, splices in girders, etc., etc.

When practicable, joints should be so arranged as to avoid having to put members together by entering them on end, as it is often impossible to get the necessary clearance in which to do this.

In all through spans floor connections should be so arranged that the floor system can be put in place after the trusses or girders have been erected in their final position, and *vice versa*, so that the trusses or girders can be erected after the floor system has been set in place.

All lateral bracing, hitch-plates, rivets in laterals, etc., should, as far as possible, be kept clear of the bottom of the ties, it being very expensive to cut out ties to clear such obstructions.

Lateral plates should be shipped loose, or bolted on so that they do not project outside of the member, whenever there is danger of them being broken off in unloading and handling.

Loose fillers should be avoided. They should be tacked on with rivets, countersunk where necessary.

In elevated railroad work, viaducts and similar structures, where longitudinal girders frame into cross girders,

shelf angles should be provided on the latter. In these structures the expansion joints should be so arranged that the rivets connecting the fixed span to the cross girder can be driven after the expansion span is in place.

In viaducts, etc., two spans, abutting on a bent, should be so arranged that either span can be set in place entirely independent of the other. The same thing applies to girder spans of different depth resting on the same bent.

Holes for anchor-bolts should be so arranged that the holes in the masonry can be drilled and the bolts put in place after the structure has been erected complete.

In structures consisting of more than one span a separate bed-plate should be provided for each shoe. This is particularly important where an old structure is to be replaced; if two shoes were put on one bed-plate or two spans connected on the same pin, it would necessitate removing two old spans in order to erect one new one.

In pin-connected spans the sections of top chords nearest the centre should be made with at least two pin-holes. In skew spans the chord splices should be so located that two opposite panels can be erected without moving the traveler.

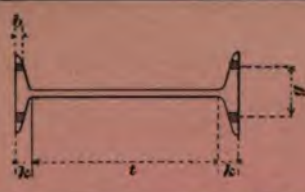
Tie plates should be kept far enough away from the joints, and enough rivets should be countersunk inside the chord to allow eyebars and other members being easily set in place.

Posts with channels or angles turned out and notched at the ends should, whenever possible, be avoided.

APPENDIX

Shapes rolled by Carnegie Steel Company

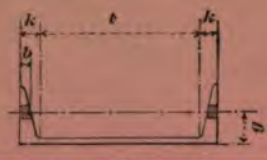
I	WEIGHT PER FOOT	FLANGE	WEB	GAUGE	TANG'T	DIST.	GRIP	MAX. RIVET OR BOLT	WALL BEARING	WALL	STANDARD FRAMING	DIST.	DIST.	WEIGHT PER FOOT	I
				g	t	k	b			T		a	c		
INCHES	POUNDS	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES			INCHES	INCHES	POUNDS	INCHES
24	100.0	7 3/4	5/8	4	20 3/4	1 5/8	7/8				24"	5 3/4	7/16	100.0	
	95.0	7 5/8	11/16	"	"	"	"					5 11/16	7/16	95.0	
	90.0	7 1/2	5/8	"	"	"	"	1	16	16" x 1" x 1'-4" 73#		5 1/2	5/8	90.0	24
	85.0	7 7/16	9/16	"	"	"	"					5 3/8	3/8	85.0	
	80.0	7	1/2	"	"	"	"					5 1/2	5/16	80.0	
20	100.0	7 9/32	5/8		16 1/2	1 3/4	15/16					5 7/8	1/2	100.0	
	95.0	7 7/32	11/16		"	"	"					5 13/16	1/2	95.0	
	90.0	7 1/8	23/32		"	"	"					5 3/4	1/2	90.0	
	85.0	7 1/16	21/32		"	"	"	7/8	16	16" x 1" x 1'-4" 73#		5 11/16	1/2	85.0	20
	80.0	7	19/32		"	"	"					5 5/8	1/2	80.0	
	75.0	6 13/16	21/32		17	1 1/2	3/4				18" and 20"	5 3/4	3/8	75.0	
	70.0	6 5/8	5/8		"	"	"					5 5/8	3/8	70.0	
	65.0	6 1/2	1/2		"	"	"					5 1/2	3/8	65.0	
18	70.0	6 1/2	23/32	3 3/4	15 1/2	1 3/8	5/8					5 3/4	7/16	70.0	
	65.0	6 5/16	5/8	"	"	"	"					5 5/8	7/16	65.0	
	60.0	6 3/32	17/32	"	"	"	"	7/8	16	16" x 1" x 1'-4" 73#		5 1/2	7/16	60.0	18
	55.0	6	7/16	"	"	"	"					5 3/8	7/16	55.0	
15	100.0	6 29/32	1 1/16	"	11	2	1					5 15/16	11/16	100.0	
	95.0	6 25/32	1 1/16	"	"	"	"					5 13/16	5/8	95.0	
	90.0	6 3/4	27/32	"	"	"	"					5 3/4	5/8	90.0	
	85.0	6 11/16	7/8	"	"	"	"	7/8				5 11/16	5/8	85.0	
	80.0	6 5/8	13/16	"	"	"	"					5 5/8	5/8	80.0	
	75.0	6 9/16	3/4	"	11 3/4	1 5/8	3/4					5 9/16	5/8	75.0	
	70.0	6 1/2	23/32	"	"	"	"		12	12" x 3/4" x 1'-4" 41#	15"	5 1/2	9/16	70.0	15
	65.0	6 7/16	11/16	"	"	"	"					5 7/16	9/16	65.0	
	60.0	6	19/32	"	"	"	"	3/4				5 3/8	9/16	60.0	
	55.0	5 3/4	21/32	3 1/2	12 1/4	1 1/4	5/16					5 3/8	1/2	55.0	
	50.0	5 5/8	11/16	"	"	"	"					5 5/16	1/2	50.0	
	45.0	5 17/32	7/16	"	"	"	"					5 1/4	7/16	45.0	
	42.0	5 1/2	19/32	"	"	"	"					5 1/8	7/16	42.0	
12	55.0	5 1/2	19/32	3 1/2	9 1/4	1 3/8	11/16					5 3/8	1/2	55.0	
	50.0	5 3/8	17/32	"	"	"	"					5 5/16	1/2	50.0	
	45.0	5 5/16	1/2	3	"	"	"	3/4	12	12" x 3/4" x 1'-0" 31#	12"	5 1/4	7/16	45.0	12
	40.0	5 1/4	7/16	"	"	"	"					5 1/8	7/16	40.0	
	35.0	5 1/8	7/16	"	9 1/4	1 1/8	1/2					5 1/16	7/16	35.0	
	31.5	5	11/32	"	"	"	"					5	3/8	31.5	

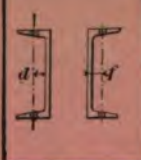


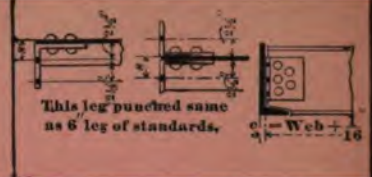
I	WEIGHT PER FOOT	FLANGE	WEB	GAUGE	TANG'T	DIST.	GRIP	MAX. RIVET OR BOLT	WALL BEARING	WALL PL	STANDARD FRAMING	DIST.	DIST.	WEIGHT PER FOOT	I
				g	*t*	*k*	*b*					*a*	*c*		
INCHES	POUNDS	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	INCHES			INCHES	INCHES	POUNDS	INCHES
10	40.0	5 $\frac{6}{32}$	$\frac{6}{4}$	3	8	1	$\frac{7}{16}$			17#		5 $\frac{3}{4}$	$\frac{7}{16}$	40.0	
	35.0	4 $\frac{15}{16}$	$\frac{10}{32}$	2 $\frac{3}{4}$	"	"	"					5 $\frac{5}{8}$	$\frac{6}{8}$	35.0	
	30.0	4 $\frac{13}{16}$	$\frac{10}{32}$	"	"	"	"	$\frac{3}{4}$	8	8" x $\frac{5}{8}$" x 1'-0"		5 $\frac{1}{2}$	$\frac{5}{16}$	30.0	*10*
	25.0	4 $\frac{11}{32}$	$\frac{5}{16}$	"	"	"	"					5 $\frac{5}{16}$	$\frac{1}{4}$	25.0	
9	35.0	4 $\frac{3}{4}$	$\frac{28}{32}$	"	7	"	"					5 $\frac{3}{4}$	$\frac{7}{16}$	35.0	
	30.0	4 $\frac{12}{32}$	$\frac{9}{16}$	"	"	"	"					5 $\frac{9}{16}$	$\frac{6}{8}$	30.0	
	25.0	4 $\frac{7}{16}$	$\frac{13}{32}$	2 $\frac{1}{2}$	"	"	"	$\frac{3}{4}$	8		7", 8", 9", & 10"	5 $\frac{7}{16}$	$\frac{5}{16}$	25.0	*9*
	21.0	4 $\frac{5}{16}$	$\frac{9}{32}$	"	"	"	"					5 $\frac{5}{16}$	$\frac{1}{4}$	21.0	
8	25.5	4 $\frac{1}{4}$	$\frac{17}{32}$	"	6 $\frac{1}{4}$	$\frac{7}{8}$	"			12#		5 $\frac{5}{16}$	$\frac{3}{8}$	25.5	
	23.0	4 $\frac{8}{32}$	$\frac{7}{16}$	"	"	"	"					5 $\frac{7}{16}$	$\frac{5}{16}$	23.0	
	20.5	4 $\frac{5}{32}$	$\frac{6}{8}$	2 $\frac{1}{4}$	"	"	"	$\frac{3}{4}$	8	8" x $\frac{5}{8}$" 0-8"	2-L^s 6" x 4" x $\frac{7}{16}$" x 0'-5" Wt. 14#	5 $\frac{5}{8}$	$\frac{1}{4}$	20.5	*8*
	18.0	4	$\frac{9}{32}$	"	"	"	"					5 $\frac{5}{16}$	$\frac{3}{16}$	18.0	
7	20.0	3 $\frac{7}{8}$	$\frac{15}{32}$	"	5 $\frac{1}{4}$	"	$\frac{5}{8}$					5 $\frac{1}{2}$	$\frac{5}{16}$	20.0	
	17.5	3 $\frac{3}{4}$	$\frac{11}{32}$	"	"	"	"	$\frac{5}{8}$	8			5 $\frac{5}{8}$	$\frac{1}{4}$	17.5	*7*
	15.0	3 $\frac{31}{32}$	$\frac{1}{4}$	"	"	"	"					5 $\frac{1}{4}$	$\frac{5}{16}$	15.0	
6	17.25	3 $\frac{9}{16}$	$\frac{18}{32}$	2	4 $\frac{1}{2}$	$\frac{3}{4}$	"			5#		5 $\frac{1}{2}$	$\frac{5}{16}$	17.25	
	14.75	3 $\frac{7}{16}$	$\frac{11}{32}$	"	"	"	"	$\frac{5}{8}$	6			5 $\frac{5}{8}$	$\frac{1}{4}$	14.75	*6*
	12.25	3 $\frac{5}{16}$	$\frac{7}{32}$	"	"	"	"					5 $\frac{1}{4}$	$\frac{3}{16}$	12.25	
5	14.75	3 $\frac{9}{32}$	$\frac{1}{2}$	1 $\frac{3}{4}$	3 $\frac{1}{2}$	$\frac{3}{4}$	$\frac{5}{16}$					5 $\frac{1}{2}$	$\frac{5}{16}$	14.75	
	12.25	3 $\frac{1}{8}$	$\frac{11}{32}$	"	"	"	"	$\frac{1}{2}$	6		5" & 6"	5 $\frac{3}{8}$	$\frac{1}{4}$	12.25	*5*
	9.75	3	$\frac{7}{32}$	"	"	"	"				2-L^s 6" x 4" x $\frac{7}{16}$" x 0'-3" for 6" Wt. 8#	5 $\frac{1}{4}$	$\frac{5}{16}$	9.75	
4	10.5	2 $\frac{7}{8}$	$\frac{13}{32}$	1 $\frac{1}{2}$	2 $\frac{3}{4}$	"	"				2-L^s " " 0'-2 $\frac{3}{4}$" " 5" Wt. 7#	5 $\frac{7}{16}$	$\frac{5}{16}$	10.5	
	9.5	2 $\frac{13}{16}$	$\frac{11}{32}$	"	"	"	"					5 $\frac{3}{8}$	$\frac{1}{4}$	9.5	*4*
	8.5	2 $\frac{25}{32}$	$\frac{1}{4}$	"	"	"	"	$\frac{1}{2}$	6	6" x $\frac{5}{16}$" x 0-6"		5 $\frac{1}{4}$	$\frac{3}{16}$	8.5	
	7.5	2 $\frac{21}{32}$	$\frac{3}{16}$	"	"	"	"				3" & 4"	5 $\frac{5}{16}$	$\frac{3}{16}$	7.5	
3	7.5	2 $\frac{1}{2}$	$\frac{11}{32}$	1 $\frac{1}{4}$	1 $\frac{3}{4}$	"	$\frac{1}{4}$				2-L^s 6" x 4" x $\frac{7}{16}$" x 0'-2" Wt. 6#	5 $\frac{3}{8}$	$\frac{1}{4}$	7.5	
	6.5	2 $\frac{19}{32}$	$\frac{1}{4}$	"	"	"	"	$\frac{1}{2}$	6			5 $\frac{1}{4}$	$\frac{3}{16}$	6.5	*3*
	5.5	2 $\frac{5}{16}$	$\frac{8}{32}$	"	"	"	"					5 $\frac{5}{16}$	$\frac{5}{16}$	5.5	

All rivets in standard framing angles are $\frac{7}{8}$" diam.
Weights of " " " include weight of shop rivets only.
When beams frame opposite each other into another beam with web thickness less than $\frac{9}{16}$" or where beams of short span lengths are loaded to their full capacity, it may be necessary to use framing angles of greater strength than the standards.
See table below for minimum span lengths.

I	WEIGHT	SPAN IN FT.	I	WEIGHT	SPAN IN FT.	I	WEIGHT	SPAN IN FT.	I	WEIGHT	SPAN IN FT.	I	WEIGHT	SPAN IN FT.	I	WEIGHT	SPAN IN FT.	I	WEIGHT	SPAN IN FT.
24	80.0	22.0				*15*	80.0	20.0							*8*	18.0	5.5	*5*	9.75	4.0
20	80.0	22.0	*18*	55.0	14.0	"	60.0	15.5	*12*	40.0	11.5	*10*	25.0	9.0	*7*	15.0	4.0	*4*	7.5	3.0
"	65.0	18.0				"	42.0	11.0	"	31.5	9.0	*9*	21.0	7.0	*6*	12.25	6.0	*3*	5.5	2.0







]	WEIGHT PER FOOT	FLANGE	WEB	GAUGE *g*	TANG'T. *t*	DIST. *k*	GRIP *b*	MAX. RIVET OR BOLT	DIST. *d*	GAUGE *f*	DIST. *s*	DIST. *c*	WEIGHT PER FOOT	[
15	55.00	$3\frac{15}{16}$	$\frac{13}{16}$	$2\frac{1}{2}$	$12\frac{3}{4}$	$1\frac{3}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$1\frac{1}{8}$	$2\frac{7}{16}$	$3\frac{5}{16}$	$\frac{7}{8}$	55.00	15
	50.00	$3\frac{63}{64}$	$\frac{13}{32}$	"	"	"	"		"	$2\frac{11}{32}$	$3\frac{1}{4}$	$\frac{29}{32}$	50.00	
	45.00	$3\frac{3}{8}$	$\frac{1}{2}$	2	"	"	"		"	$2\frac{1}{4}$	$3\frac{1}{8}$	$\frac{15}{16}$	45.00	
	40.00	$3\frac{17}{32}$	$\frac{17}{32}$	"	"	"	"		"	$2\frac{5}{32}$	3	$\frac{3}{4}$	40.00	
	35.00	$3\frac{7}{16}$	$\frac{7}{16}$	"	"	"	"		"	$2\frac{1}{16}$	$2\frac{13}{16}$	$\frac{1}{2}$	35.00	
	33.00	$3\frac{13}{32}$	$\frac{13}{32}$	"	"	"	"		"	$2\frac{1}{32}$	$2\frac{15}{16}$	$\frac{1}{2}$	33.00	
12	40.00	$3\frac{13}{16}$	$\frac{3}{4}$	"	10	1	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{19}{32}$	$2\frac{7}{32}$	$3\frac{1}{4}$	$\frac{13}{16}$	40.00	12
	35.00	$3\frac{9}{16}$	$\frac{11}{16}$	"	"	"	"		"	$2\frac{3}{32}$	$3\frac{1}{8}$	$\frac{11}{16}$	35.00	
	30.00	$3\frac{5}{32}$	$\frac{1}{2}$	$1\frac{3}{4}$	"	"	"		"	$1\frac{31}{32}$	3	$\frac{9}{16}$	30.00	
	25.00	$3\frac{1}{16}$	$\frac{13}{32}$	"	"	"	"		"	$1\frac{7}{8}$	$2\frac{7}{8}$	$\frac{7}{16}$	25.00	
	20.50	$2\frac{15}{16}$	$\frac{9}{32}$	"	"	"	"		"	$1\frac{3}{4}$	$2\frac{13}{16}$	$\frac{5}{16}$	20.50	
10	35.00	$3\frac{5}{16}$	$\frac{13}{16}$	"	$8\frac{1}{4}$	$\frac{7}{8}$	"	$\frac{3}{4}$	$1\frac{1}{4}$	$2\frac{1}{16}$	$3\frac{5}{16}$	$\frac{7}{8}$	35.00	10
	30.00	$3\frac{1}{32}$	$\frac{11}{16}$	"	"	"	"		"	$1\frac{15}{16}$	$3\frac{1}{16}$	$\frac{3}{4}$	30.00	
	25.00	$2\frac{7}{8}$	$\frac{17}{32}$	"	"	"	$\frac{7}{16}$		"	$1\frac{29}{32}$	$3\frac{1}{16}$	$\frac{5}{8}$	25.00	
	20.00	$2\frac{23}{32}$	$\frac{3}{8}$	$1\frac{1}{2}$	"	"	"		"	$1\frac{5}{8}$	$2\frac{7}{8}$	$\frac{7}{16}$	20.00	
	15.00	$2\frac{13}{32}$	$\frac{1}{4}$	"	"	"	"		"	$1\frac{1}{2}$	$2\frac{3}{4}$	$\frac{3}{16}$	15.00	
9	25.00	$2\frac{15}{16}$	$\frac{3}{8}$	"	$7\frac{1}{4}$	$\frac{7}{8}$	"	$\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{3}{4}$	$3\frac{7}{8}$	$\frac{11}{16}$	25.00	9
	20.00	$2\frac{21}{32}$	$\frac{7}{16}$	"	"	"	"		"	$1\frac{9}{16}$	$2\frac{15}{16}$	$\frac{1}{2}$	20.00	
	15.00	$2\frac{1}{2}$	$\frac{5}{32}$	$1\frac{3}{8}$	"	"	"		"	$1\frac{13}{32}$	$2\frac{13}{16}$	$\frac{3}{8}$	15.00	
	13.25	$2\frac{7}{16}$	$\frac{7}{32}$	"	"	"	"		"	$1\frac{11}{32}$	$2\frac{3}{4}$	$\frac{3}{16}$	13.25	
8	21.25	$2\frac{5}{8}$	$\frac{9}{16}$	$1\frac{1}{2}$	$6\frac{1}{4}$	"	$\frac{3}{8}$	$\frac{3}{4}$	$1\frac{1}{16}$	$1\frac{25}{32}$	$3\frac{1}{16}$	$\frac{5}{8}$	21.25	8
	18.75	$2\frac{17}{32}$	$\frac{1}{2}$	"	"	"	"		"	$1\frac{9}{16}$	3	$\frac{9}{16}$	18.75	
	16.25	$2\frac{7}{16}$	$\frac{15}{32}$	"	"	"	"		"	$1\frac{13}{32}$	$2\frac{7}{8}$	$\frac{7}{16}$	16.25	
	13.75	$2\frac{11}{32}$	$\frac{7}{16}$	$1\frac{3}{8}$	"	"	"		"	$1\frac{3}{8}$	$2\frac{13}{16}$	$\frac{3}{8}$	13.75	
	11.25	$2\frac{1}{4}$	$\frac{7}{32}$	"	"	"	"		"	$1\frac{9}{32}$	$2\frac{3}{4}$	$\frac{5}{16}$	11.25	
7	19.75	$2\frac{1}{4}$	$\frac{5}{8}$	$1\frac{1}{2}$	$5\frac{1}{2}$	$\frac{3}{4}$	"	$\frac{5}{8}$	$1\frac{1}{16}$	$1\frac{11}{16}$	$3\frac{1}{8}$	$\frac{11}{16}$	19.75	7
	17.25	$2\frac{15}{32}$	$\frac{17}{32}$	"	"	"	"		"	$1\frac{19}{32}$	$3\frac{1}{16}$	$\frac{9}{16}$	17.25	
	14.75	$2\frac{5}{16}$	$\frac{7}{16}$	"	"	"	"		"	$1\frac{1}{2}$	$2\frac{15}{16}$	$\frac{1}{2}$	14.75	
	12.25	$2\frac{3}{16}$	$\frac{5}{16}$	$1\frac{1}{4}$	"	"	"		"	$1\frac{5}{8}$	$2\frac{13}{16}$	$\frac{3}{8}$	12.25	
	9.75	$2\frac{1}{16}$	$\frac{5}{32}$	"	"	"	"		"	$1\frac{3}{32}$	$2\frac{3}{4}$	$\frac{1}{4}$	9.75	
6	15.50	$2\frac{5}{32}$	$\frac{9}{16}$	"	$4\frac{1}{2}$	"	"	$\frac{5}{8}$	$\frac{15}{16}$	$1\frac{1}{8}$	$3\frac{1}{16}$	$\frac{5}{8}$	15.50	6
	13.00	$2\frac{1}{32}$	$\frac{7}{16}$	"	"	"	"		"	$1\frac{3}{8}$	$2\frac{15}{16}$	$\frac{1}{2}$	13.00	
	10.50	$2\frac{1}{32}$	$\frac{5}{16}$	"	"	"	"		"	$1\frac{1}{4}$	$2\frac{13}{16}$	$\frac{3}{8}$	10.50	
	8.00	$1\frac{29}{32}$	$\frac{5}{16}$	$1\frac{1}{4}$	"	"	"		"	$1\frac{1}{8}$	$2\frac{11}{16}$	$\frac{1}{4}$	8.00	
5	11.50	$2\frac{1}{32}$	$\frac{15}{32}$	"	$3\frac{3}{4}$	$\frac{5}{8}$	$\frac{5}{16}$	$\frac{1}{2}$	$\frac{7}{8}$	$1\frac{11}{32}$	3	$\frac{9}{16}$	11.50	5
	9.00	$1\frac{29}{32}$	$\frac{11}{32}$	"	"	"	"		"	$1\frac{7}{32}$	$2\frac{13}{16}$	$\frac{5}{8}$	9.00	
	6.50	$1\frac{7}{8}$	$\frac{5}{16}$	"	"	"	"		"	$1\frac{1}{16}$	$2\frac{11}{16}$	$\frac{1}{4}$	6.50	
4	7.25	$1\frac{29}{32}$	$\frac{5}{16}$	1	$2\frac{3}{4}$	$\frac{5}{8}$	"	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{1}{16}$	$2\frac{13}{16}$	$\frac{3}{8}$	7.25	4
	6.25	$1\frac{31}{32}$	$\frac{1}{4}$	"	"	"	"		"	1	$2\frac{3}{4}$	$\frac{5}{16}$	6.25	
	5.25	$1\frac{15}{16}$	$\frac{5}{16}$	"	"	"	"		"	$\frac{15}{16}$	$2\frac{11}{16}$	$\frac{1}{4}$	5.25	
3	6.00	$1\frac{15}{16}$	$\frac{3}{8}$	$\frac{7}{8}$	$1\frac{3}{4}$	$\frac{5}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{5}{8}$	1	$2\frac{7}{8}$	$\frac{7}{16}$	6.00	3
	5.00	$1\frac{1}{2}$	$\frac{1}{4}$	"	"	"	"		"	$\frac{7}{8}$	$2\frac{3}{4}$	$\frac{3}{16}$	5.00	
	4.00	$1\frac{13}{32}$	$\frac{5}{16}$	"	"	"	"		"	$\frac{29}{32}$	$2\frac{11}{16}$	$\frac{1}{4}$	4.00	

All dimensions in inches

NOMINAL SIZE	THICKNESS	ACTUAL SIZE FLANGES & WEB	WEIGHT PER FOOT	AREA IN SQ. INCHES	GAUGE G	MAX. RIVETS G	MAX. RIVETS G^1	GAUGE G^1	THICKNESS	NOMINAL SIZE
3	1/4	2 11/16 x 3 x 2 11/16	6.7	1.97	1 13/16	3/4	3/4	1 1/2	1/4	
	5/16	2 3/4 x 3 1/16 x 2 3/4	8.4	2.48	"	"	"	"	5/16	
	3/8	2 11/16 x 3 x 2 11/16	9.7	2.86	"	"	"	"	3/8	
	7/16	2 3/4 x 3 1/16 x 2 3/4	11.4	3.36	"	"	"	"	7/16	
	1/2	2 11/16 x 3 x 2 11/16	12.5	3.69	"	"	"	"	1/2	3
	9/16	2 3/4 x 3 1/16 x 2 3/4	14.2	4.18	"	"	"	"	9/16	
4	1/4	3 1/16 x 4 x 3 1/16	8.2	2.41	2	3/4	7/8	2	1/4	
	5/16	3 1/8 x 4 1/16 x 3 1/8	10.3	3.03	"	"	"	"	5/16	
	3/8	3 3/16 x 4 1/8 x 3 3/16	12.4	3.66	"	"	"	"	3/8	
	7/16	3 1/4 x 4 x 3 1/4	13.8	4.05	"	"	"	"	7/16	
	1/2	3 5/16 x 4 1/16 x 3 5/16	15.8	4.66	"	"	"	"	1/2	
	9/16	3 3/8 x 4 1/8 x 3 3/8	17.9	5.27	"	"	"	"	9/16	4
	5/8	3 7/16 x 4 x 3 7/16	18.9	5.55	"	"	"	"	5/8	
	11/16	3 1/2 x 4 1/16 x 3 1/2	20.9	6.14	"	"	"	"	11/16	
	3/4	3 9/16 x 4 1/8 x 3 9/16	22.9	6.75	"	"	"	"	3/4	
5	5/16	3 1/4 x 5 x 3 1/4	11.6	3.40	2 1/16	7/8	7/8	2 1/2	5/16	
	3/8	3 5/16 x 5 1/16 x 3 5/16	13.9	4.10	"	"	"	"	3/8	
	7/16	3 3/8 x 5 1/8 x 3 3/8	16.4	4.81	"	"	"	"	7/16	
	1/2	3 1/2 x 5 x 3 1/2	17.8	5.25	"	"	"	"	1/2	
	9/16	3 5/8 x 5 1/16 x 3 5/8	20.2	5.94	"	"	"	"	9/16	
	5/8	3 3/4 x 5 1/8 x 3 3/4	22.6	6.64	"	"	"	"	5/8	5
	11/16	3 1/4 x 5 x 3 1/4	23.7	6.96	"	"	"	"	11/16	
	3/4	3 5/16 x 5 1/16 x 3 5/16	26.0	7.64	"	"	"	"	3/4	
	13/16	3 3/8 x 5 1/8 x 3 3/8	28.3	8.33	"	"	"	"	13/16	
6	3/8	3 1/2 x 6 x 3 1/2	15.6	4.59	2 1/4	7/8	7/8	3	3/8	
	7/16	3 5/16 x 6 1/16 x 3 5/16	18.3	5.39	"	"	"	"	7/16	
	1/2	3 3/8 x 6 1/8 x 3 3/8	21.0	6.19	"	"	"	"	1/2	
	9/16	3 1/2 x 6 x 3 1/2	22.7	6.68	"	"	"	"	9/16	
	5/8	3 5/16 x 6 1/16 x 3 5/16	25.4	7.46	"	"	"	"	5/8	
	11/16	3 3/8 x 6 1/8 x 3 3/8	28.0	8.25	"	"	"	"	11/16	6
	3/4	3 1/2 x 6 x 3 1/2	29.3	8.63	"	"	"	"	3/4	
	13/16	3 5/16 x 6 1/16 x 3 5/16	32.0	9.40	"	"	"	"	13/16	
	7/8	3 3/8 x 6 1/8 x 3 3/8	34.6	10.17	"	"	"	"	7/8	

WEIGHTS OF ANGLES

All dimensions in inches

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	SIZE
8 x 8							26.4	29.5	32.7	35.8	38.9	42.0	45.0	48.0	51.0	54.0	56.9	8 x 8
6 x 6					14.8	17.2	19.6	21.9	24.2	26.5	28.7	30.9	33.1	35.3	37.4			6 x 6
* 5 x 5					12.3	14.3	16.2	18.1	20.0	21.8	23.6	25.4	27.2	28.9	30.6			* 5 x 5
4 x 4				8.2	9.8	11.3	12.8	14.3	15.7	17.1	18.5	19.9						4 x 4
3½ x 3½				7.1	8.5	9.8	11.1	12.3	13.6	14.8	16.0	17.1						3½ x 3½
3 x 3			4.9	6.1	7.2	8.3	9.4	10.4	11.4									3 x 3
* 2¾ x 2¾			4.5	5.5	6.6	7.6	8.5											* 2¾ x 2¾
2½ x 2½		3.1	4.0	5.0	5.9	6.8	7.7											2½ x 2½
* 2¼ x 2¼		2.8	3.7	4.5	5.3	6.1	6.8											* 2¼ x 2¼
2 x 2		2.5	3.2	4.0	4.7	5.3												2 x 2
1¾ x 1¾		2.1	2.8	3.4	4.0	4.6												1¾ x 1¾
1½ x 1½	1.2	1.8	2.4	2.9	3.4													1½ x 1½
1¼ x 1¼	1.0	1.5	1.9	2.4														1¼ x 1¼
1 x 1	0.8	1.2	1.5															1 x 1

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	SIZE
* 7 x 3½						15.0	17.0	19.0	21.0	23.0	24.9	26.8	28.7	30.5	32.3			* 7 x 3½
6 x 4					12.3	14.3	16.2	18.1	20.0	21.8	23.6	25.4	27.2	28.9	30.6			6 x 4
6 x 3½					11.7	13.5	15.3	17.1	18.9	20.6	22.3	24.0	25.7	27.3	28.9			6 x 3½
* 5 x 4					11.0	12.8	14.5	16.2	17.8	19.5	21.1	22.6	24.2					* 5 x 4
5 x 3½				8.7	10.4	12.0	13.6	15.2	16.8	18.3	19.8	21.3	22.7					5 x 3½
5 x 3				8.2	9.8	11.3	12.8	14.2	15.7	17.1	18.5	19.9						5 x 3
* 4 x 3½				7.7	9.1	10.5	11.9	13.3	14.6	15.9	17.2	18.5						* 4 x 3½
4 x 3				7.1	8.5	9.8	11.1	12.3	13.6	14.8	16.0	17.1						4 x 3
3½ x 3				6.6	7.8	9.1	10.2	11.4	12.5	13.6	14.7	15.7						3½ x 3
3½ x 2½			4.9	6.1	7.2	8.3	9.4	10.4	11.4	12.4								3½ x 2½
3 x 2½			4.5	5.5	6.6	7.6	8.5	9.5										3 x 2½
3 x 2			4.0	5.0	5.9	6.8	7.7											3 x 2
2½ x 2		2.8	3.7	4.5	5.3	6.1	6.8											2½ x 2

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	SIZE

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ANGLES

Area in square inches.

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	SIZE
× 8							7.75	8.68	9.61	10.53	11.44	12.34	13.23	14.12	15.00	15.87	16.73	8 × 8
× 6					4.36	5.06	5.75	6.43	7.11	7.78	8.44	9.09	9.74	10.37	11.00			6 × 6
× 5					3.61	4.18	4.75	5.31	5.86	6.42	6.94	7.46	7.99	8.50	9.00			* 5 × 5
× 4				2.40	2.86	3.31	3.75	4.18	4.61	5.03	5.44	5.84						4 × 4
× 3½				2.09	2.48	2.87	3.25	3.62	3.98	4.34	4.69	5.03						3½ × 3½
× 3			1.44	1.78	2.11	2.43	2.75	3.06	3.36									3 × 3
× 2½			1.31	1.62	1.92	2.22	2.50											* 2½ × 2½
× 2½		0.90	1.19	1.47	1.73	2.00	2.25											2½ × 2½
× 2½		0.81	1.06	1.31	1.55	1.78	2.00											* 2½ × 2½
× 2		0.72	0.94	1.15	1.36	1.56												2 × 2
× 1¾		0.62	0.81	1.00	1.17	1.30												1¾ × 1¼
× 1½	0.36	0.53	0.69	0.84	0.99													1½ × 1½
× 1¼	0.30	0.43	0.56	0.69														1¼ × 1¼
× 1	0.24	0.34	0.44															1 × 1

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	SIZE
× 3½						4.40	5.00	5.59	6.17	6.75	7.31	7.87	8.42	8.97	9.50			* 7 × 3½
× 4					3.61	4.18	4.75	5.31	5.86	6.41	6.94	7.47	7.99	8.50	9.00			6 × 4
× 3½					3.42	3.97	4.50	5.03	5.55	6.06	6.56	7.06	7.55	8.03	8.50			6 × 3½
× 4					3.23	3.75	4.25	4.75	5.23	5.72	6.19	6.65	7.11					* 5 × 4
× 3½				2.56	3.05	3.53	4.00	4.47	4.92	5.37	5.81	6.25	6.67					5 × 3½
× 3				2.40	2.86	3.31	3.75	4.18	4.61	5.03	5.44	5.84						5 × 3
× 3½				2.25	2.67	3.09	3.50	3.90	4.30	4.68	5.06	5.43						* 4 × 3½
× 3				2.09	2.48	2.87	3.25	3.62	3.98	4.34	4.69	5.03						4 × 3
× 3				1.93	2.30	2.65	3.00	3.34	3.67	4.00	4.31	4.62						3½ × 3
× 2½			1.44	1.78	2.11	2.43	2.75	3.06	3.36	3.65								3½ × 2½
× 2½			1.31	1.62	1.92	2.22	2.50	2.78										3 × 2½
× 2			1.19	1.47	1.73	2.00	2.25											3 × 2
× 2		0.81	1.06	1.31	1.55	1.78	2.00											2½ × 2

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	SIZE

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